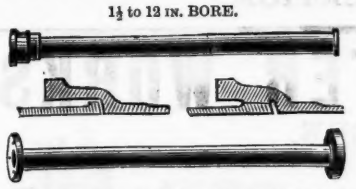
THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXVI. No. 1688.] LONDON, SEPTEMBER 17, 1895. [47TH YEAR. PRICE 6d.

GAS AND WATER PIPES

1½ to 12 IN. BORE.



THOMAS ALLAN & SONS,

Bonlea Foundry,

SOUTH STOCKTON-ON-TEES.

Formerly Springbank Iron Works, Glasgow.

ESTABLISHED 1848.

ALSO MANUFACTURERS OF

SANITARY & RAIN-WATER PIPES, HOT WATER PIPES, STABLE FITTINGS, RANGES, STOVES, And GENERAL CASTINGS.

Telegrams: "BONLEA, STOCKTON-ON-TEES."

Lanemark Coal Co.,

LIMITED.

LANEMARK CANNEL AND GAS COALS.

Quotations and Analysis on Application to

LANEMARK COLLIERY,

NEW CUMNOCK, N.B.

Shipping Ports: All the principal Scotch Ports.

— ESTABLISHED 1830. —

PARKER & LESTER,

Manufacturers & Contractors.

THE ONLY MAKERS OF

PATENT ANTIMONY PAINT,

Parker's Imperial Black Varnish,

Oxide Paints, Oils, and General Stores for Gas and Water Works.

WORKS:

ORMSIDE STREET, OLD KENT ROAD, LONDON.

"BEAR CREEK" CANNEL.

LOG MOUNTAIN COAL, COKE, AND TIMBER CO., PINEVILLE, KENTUCKY, U.S.A.

Cable Address: "Hull, Pineville."

LONDON AGENTS:

W. J. WILSON & CO., Suffolk House, Cannon St., E.C.

THE ALLIANCE METER COMPANY, LTD.

WET & DRY GAS-METERS.

FREE SAMPLES

for Inspection and Test sent Carriage Paid.

These Meters, manufactured at the Company's Factories in the United States of America, are of superior quality and workmanship, and contain many valuable Improvements, which render them less liable to derangement than any other Meters.

They will not allow the smallest quantity of Gas to pass without being registered, and are warranted to register correctly, and not to vary with different pressures.

THE ALLIANCE METER COMPANY, Ltd., 9, London Street, London, E.C.

SAWER & PURVES, Garratt St. Works, MANCHESTER,

MANUFACTURERS OF

IMPROVED WET GAS-METERS IN CAST-IRON CASES,

THE UNVARYING WATER-LINE GAS-METER,

IMPROVED DRY GAS-METERS.

Speciality: PATENT CASH PREPAYMENT METERS.

CATALOGUE SENT ON APPLICATION.

PUMPS FOR GAS & WATER WORKS.

FIRST AWARDS EVERYWHERE.

TELEGRAMS: "EVANS WOLVERHAMPTON."

LATEST HIGHEST AWARD, TASMANIA, 1895.
"Special" First-Class Certificate.

APPLY FOR CATALOGUE NO. 8.

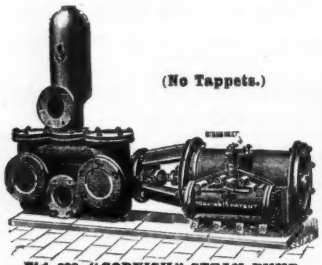


Fig. 600. "CORNISH" STEAM-PUMP FOR WATER.

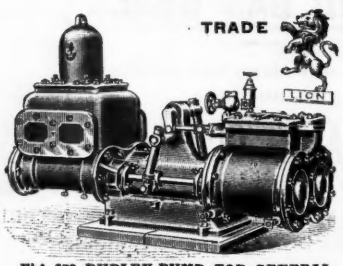


Fig. 670. DUPLEX PUMP FOR GENERAL PURPOSES.

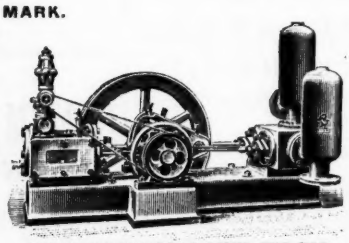


Fig. 685. "RELIABLE" PUMP FOR TAR AND THICK FLUIDS.

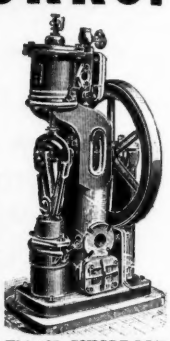
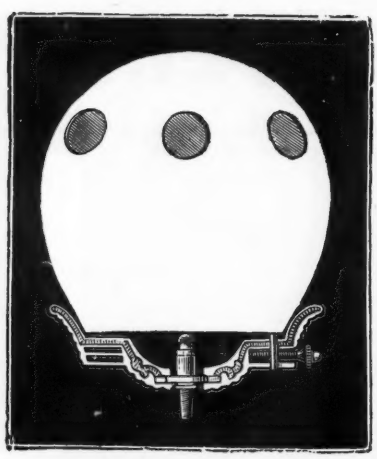


Fig. 705. SINGLE RAM PUMP FOR BOILER FEEDING, &c.

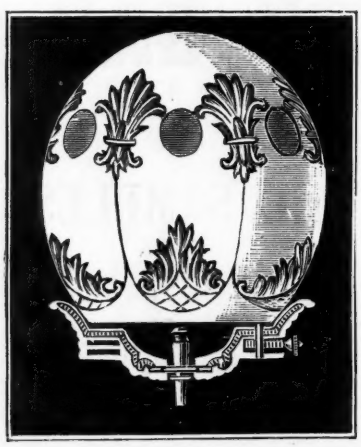
JOSEPH EVANS & SONS, Hydraulic Engineers,

WOLVERHAMPTON. LONDON OFFICE: 16, Union Court, Old Broad Street, E.C.

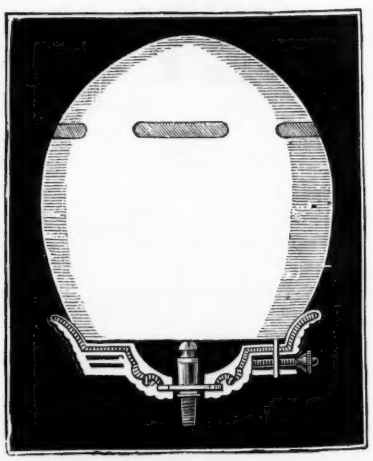
THE UNIQUE GLOBE.



No. 1085.



No. 31,065.



No. 1318.

We supply these Globes in many Varieties and Decorations, Flint, Coloured, and Opal in

MANOGRAPHY, ETCHED, OR PAINTED.

Large Stock, in original cases or loose, always ready. Our quality Opal is the best and strongest.

CATALOGUE AND PRICES ON APPLICATION (to the Trade only) TO

FALK, STADELMANN, & Co.

VERITAS LAMP WORKS, Limited,

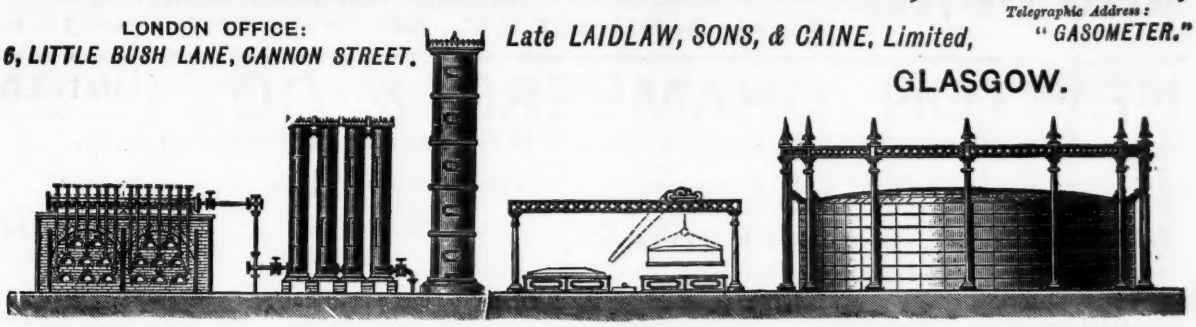
83, 85, & 87, FARRINGDON ROAD, LONDON, E.C.

THE BARROWFIELD IRON-WORKS, LIMITED,

LONDON OFFICE:
6, LITTLE BUSH LANE, CANNON STREET.

Late LAIDLAW, SONS, & CAINE, Limited,
GLASGOW.

Telegraphic Address:
"GASOMETER."



MANUFACTURERS OF ALL KINDS OF GAS PLANT.

RETORT-BENCH FITTINGS; SIEMENS'S REGENERATIVE AND ORDINARY FURNACES;
CONDENSERS, EXHAUSTERS, AND ENGINES; SCRUBBERS, WASHERS;
PURIFIERS, WITH PLANED AND CEMENT JOINTS;
DRY AND HYDRAULIC CENTRE-VALVES;
HYDRAULIC AND HAND-POWER LIFTING APPARATUS;
GASHOLDERS, SINGLE-LIFT & TELESCOPE; CAST & WROUGHT-IRON TANKS;
STATION METERS; GOVERNORS; SCREW AND RACK VALVES;
FOUR-WAY COCKS AND HYDRAULIC VALVES;
CAST-IRON GAS, WATER, & STEAM PIPES & CONNECTIONS; WROUGHT-IRON TUBES & FITTINGS;
IRON ROOFING, MARKET BUILDINGS, BRIDGES, GIRDERS, STEAM BOILERS;
PROMENADE PIERS AND LOADING WHARVES.

MANUFACTURERS OF OIL PLANT OF EVERY DESCRIPTION.

HENDERSON'S Patent Retorts, Condensers, Stills, Cast and Wrought Iron Tanks, Ammonia Stills, Wrought-Iron Gas-Mains, &c., &c.

DESCRIPTIVE SPECIFICATIONS AND ESTIMATES ON APPLICATION.

W. H. ALLEN & CO.,

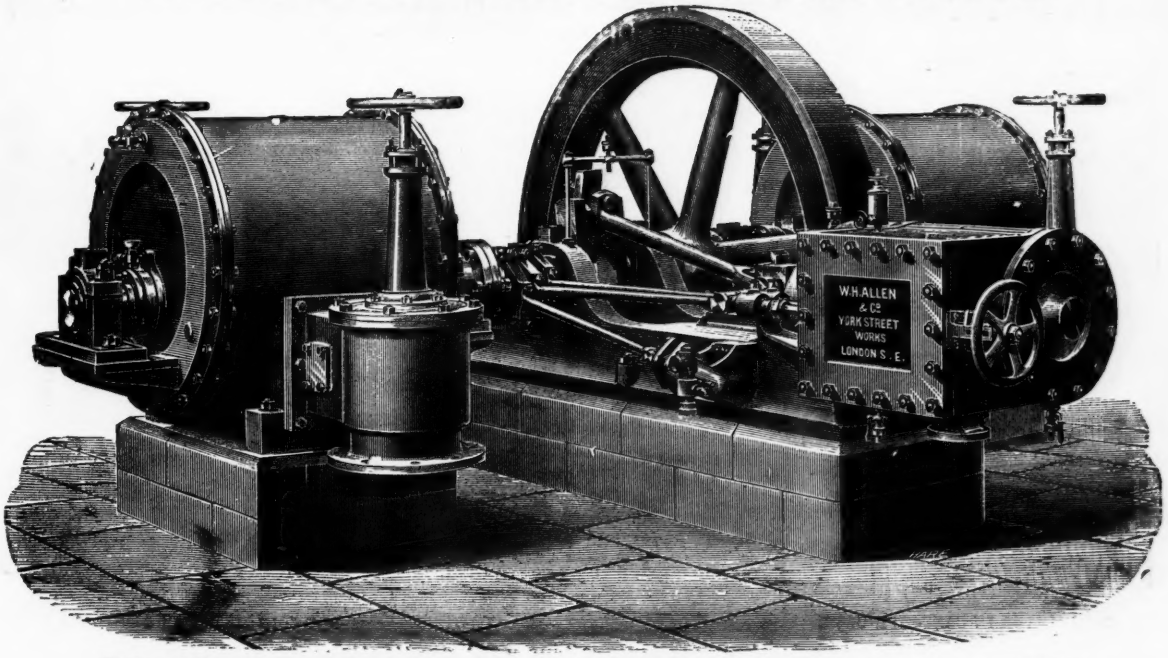
YORK STREET WORKS, LAMBETH, LONDON, S.E.,

And of QUEEN'S ENGINEERING WORKS, BEDFORD,

MAKERS OF THE MOST IMPROVED FORM OF

GAS EXHAUSTING MACHINERY

BEALE'S PATENT—ALLEN'S COMBINED SYSTEM.



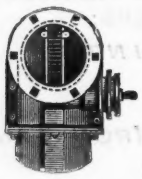
Pair of Non-Oscillating Exhausters, passing 200,000 Cubic Feet of Gas per Hour.

GAS COAL.

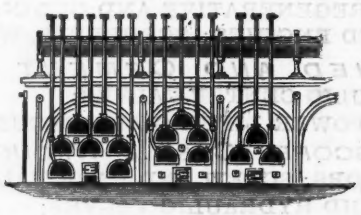
BEST
REAL OLD SILKSTONE GAS COAL,
Address THE STRAFFORD COLLIERIES COMPANY,
Near BARNSLEY, SOUTH YORKSHIRE.

NEWTON, CHAMBERS, & CO., LIMITED
THORNCLIFFE IRON-WORKS, near SHEFFIELD,
MANUFACTURERS OF

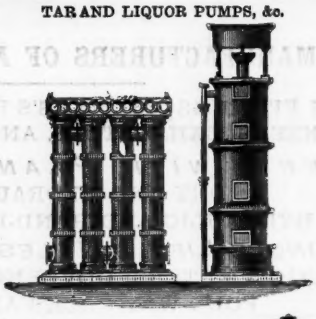
SLIDE VALVES,
WITH RACK & PINION
OR
Internal or External
SCREWS of all sizes
GASHOLDERS,
AND
Gasholder Tanks.



CAST-IRON RETORTS,
RETORT-BED FITTINGS,
And Retort-House Appliances
of every description,
Iron Roofs, Columns, Girders, Floor Plates,
Tools, &c.

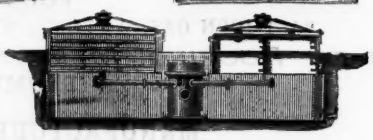


WROUGHT AND CAST IRON
CONDENSERS,
SCRUBBERS, & WASHERS,
TAR AND LIQUOR PUMPS, &c.



PATENT
CENTRE-VALVES
for working Purifiers,
Also Bye-Pass & Stop Valves.

PURIFIERS with Planed Joints,
HAND and HYDRAULIC LIFTING GEAR, CAST-IRON MAINS, and SPECIALS.
WOOD GRIDS.
CAST AND WROUGHT IRON TANKS AND CISTERNS.



DESIGNS, SPECIFICATIONS, AND ESTIMATES FREE.

Pig Iron (*Special Quality*) for ENGINE CYLINDERS, &c.

GAS COAL FAMOUS FOR ITS UNRIVALLED EXCELLENCE.

GEORGE ORME & CO.
ATLAS METER WORKS, OLDHAM.

Manufacturers of

ORME'S PATENT IMPROVED COIN METER.

We are now supplying our Wet Coin Meters in Cast-Iron and Tin-Plate Cases, both Ordinary and Compensating; also Dry Coin Meters in Tin-Plate Cases.

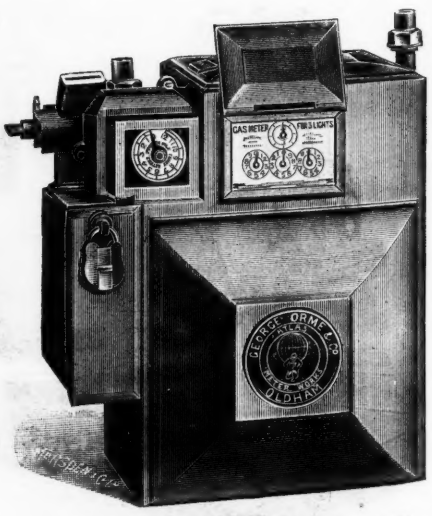
WET COIN METER IN CAST-IRON CASE.

A large number of these Meters are in use, and giving satisfaction.

The Mechanism is very simple; and there are no springs or complicated parts to get out of order.

We supply them to work with **1d., 1s., or any other Coin desired.**

The Selling Price of Gas can be changed *in Situ*, and any number of feet delivered, as may be required.



DRY COIN METER IN TIN-PLATE CASE.

Any further Particulars sent upon application.
Telegraphic Address: "ORME, OLDHAM." Telephone: No. 93, Oldham.

WEST'S GAS IMPROVEMENT COMPANY, LTD.,

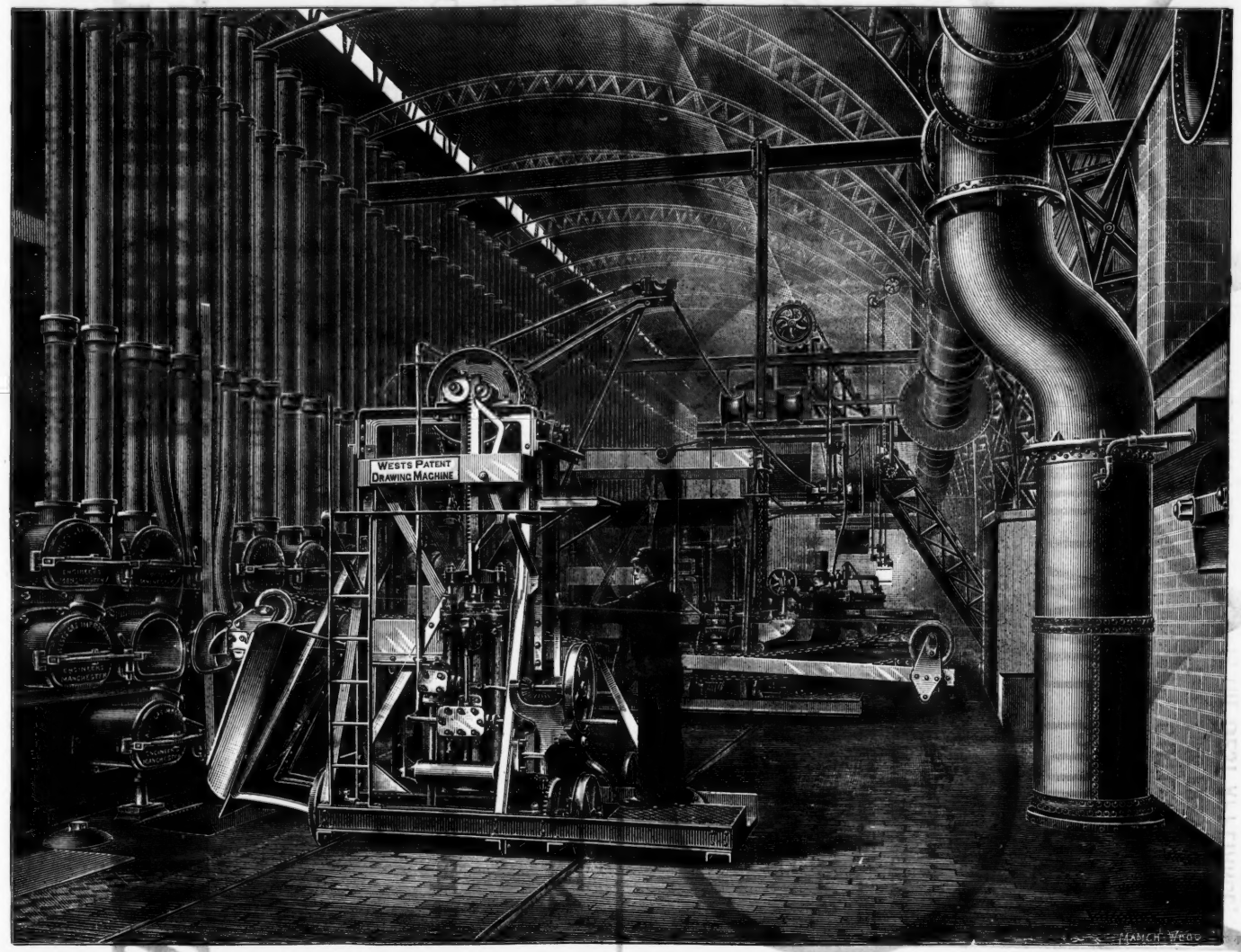
ALBION IRON-WORKS, MILES PLATTING, MANCHESTER.

AND

104, Queen Victoria St.,

LONDON, E.C.

WEST'S MANUAL AND POWER MACHINERY FOR CHARGING AND DRAWING GAS-RETORTS.



AND

104, Queen Victoria St.,

LONDON, E.C.

OVER 560,000 LINEAL FEET OF RETORTS DAILY ARE CHARGED AND DRAWN BY WEST'S MACHINES.

Interior of Retort-House at the Bradford Road Gas-Works, Manchester, showing the Compressed-Air Drawing and Charging Machines.

THE

Irish Incandescent Gas-Light Co.,

LIMITED,

HAVING ACQUIRED

The Sole License for the Sale of

INCANDESCENT GAS-LAMPS

(Welsbach System)

In Ireland,

HEREBY GIVE NOTICE THAT

All Communications relative to Lighting must be addressed to

THE MANAGER,

62, GRAFTON STREET, DUBLIN.

CUTLERS
PATENT TUBULAR
GAS CONDENSER
SUITABLE FOR GASWORKS OF ALL SIZES, AND FOR ANY CLIMATE
OVER 100 ERECTED
TANKS
MAKERS OF
GASHOLDERS
OF EVERY SIZE AND TYPE
ROOFS
HUNT'S
PATENT
WASHER.
IS THE ONLY APPARATUS NECESSARY BETWEEN THE CONDENSER & PURIFIERS, IT REQUIRES NO MOTIVE POWER
TELEGRAMS "RETORTUS" LONDON
NATIONAL TELEPHONE 5059.
S. CUTLER & SONS, MILLWALL LONDON
AGENTS FOR THE "MAXIM" CARBURETTER, A MOST SUCCESSFUL ENRICHER, BY WHICH THE USE OF CANNEL COAL IS AVOIDED AND ALL TROUBLES WITH NAPHTHALENE OBVIATED
FOREIGN AGENTS
IMPROVED SYSTEM OF CARBURETTED WATER-GAS PLANT
PARTICULARS ON APPLICATION.
COLONIAL AGENTS
CUTLER'S FREEZING PREVENTER IS THE BEST APPLIANCE, FOR PREVENTING FORMATION OF ICE IN GASHOLDER CUPS. IT IS IN USE AT MANY IMPORTANT WORKS IN ENGLAND, GERMANY, AUSTRIA, AND AMERICA.
ELECTRIC FITTINGS
DYNAMOS MOTORS.

IMPROVEMENTS IN STREET LIGHTING.
HIGHEST EFFICIENCY WITH GREATEST ECONOMY.

LIGHTING AUTHORITIES, GAS ENGINEERS, & GAS MANAGERS

Are invited to inspect the

INCANDESCENT GAS-LIGHT

Which has now been successfully adapted to the purposes of

STREET LIGHTING,

THE DIFFICULTIES CAUSED BY VIBRATION HAVING BEEN OVERCOME BY THE USE OF A SPECIAL BURNER, WHICH GIVES HIGHLY SATISFACTORY RESULTS.

Two forms of Burners are specially recommended for Street Lighting.

The "C" BURNER,

Giving a Light of 60 Candles, with a Consumption of 3½ Cubic Feet of Gas an Hour.

The "S" BURNER,

Giving a Light of 25 to 30 Candles, with a Consumption of 2¼ Feet of Gas an Hour.

This System of Lighting meets the Requirements of all the Lighting Authorities in those Districts where it is desired to effect an Improvement in Street Lighting, without any increase of expenditure.

THE INCANDESCENT GAS-LIGHT has been tried with most satisfactory results for Street Lighting purposes in many Towns throughout the United Kingdom.

The Lighting Engineer of the Kensington Vestry, in a report dated the 14th of May, 1895, addressed the Works and Sanitary Committee as follows:—

(1) During the months of January, February, and March, 1895, 81 Incandescent Gas-Lamps were in use for an average period of 1167·89 hours.

The estimated quantity of gas that would have been consumed by the 10-feet flat-flame burner was 11,678 cubic feet. The actual quantity of gas used by the Incandescent Gas-Light Company's Burners, as recorded by the meters, was 4415 cubic feet.

After allowing for the extra cost of up-keep, the gain to the Vestry by the use of these burners was £20 3s. 4¾d., and a large increase in the Illumination of the Street.

(2) The illuminating power given by the Incandescent Gas-Burners, consuming 3·78 cubic feet of gas per hour, was found to be equal to 60 candles. That given by the flat-flame burners, consuming 10 cubic feet of gas per hour, was 26 candles.

The lanterns fitted with Incandescent Burners only require cleaning 9 times in 90 days, as compared with 26 times' cleaning in the same period required by the lanterns fitted with flat-flame burners.

The net result therefore appears to be that, by the use of the Incandescent Gas-Light System, the saving effected is over 50s. per annum per lamp, and at the same time more than double the light is obtained.

It must be noted, however, that these results were obtained with the ordinary burners, and not with the improved burners with the anti-vibration springs. With the latter, the expense of up-keep would be materially reduced, and the saving consequently increased.

For further Particulars, apply to

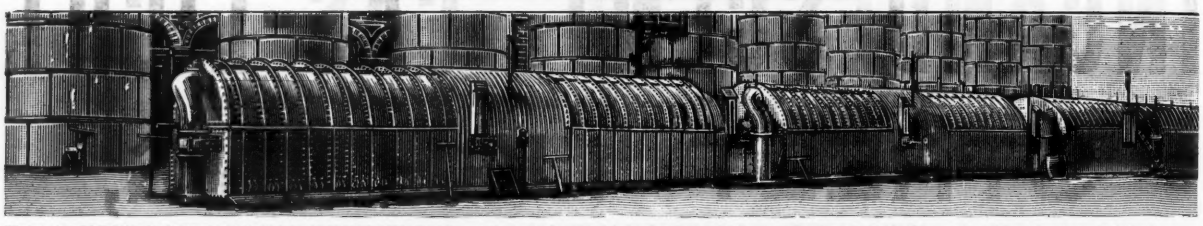
THE INCANDESCENT GAS-LIGHT COMPANY, LTD.,

PALMER STREET, WESTMINSTER, LONDON, S.W.

KIRKHAM, HULETT, & CHANDLER, LD.

PATENT "STANDARD" WASHER-SCRUBBER

☛ **502** of these Machines (capable of dealing with **488,800,000** cubic feet of Gas daily) in use and in course of construction, which fact is given as evidence of this apparatus being the Most Efficient of any in the Market for the extraction of Ammonia, Carbonic Acid, and Sulphuretted Hydrogen from Coal Gas.



View of SIX PATENT "STANDARD" WASHER-SCRUBBERS, erected at the Beckton Station of The Gaslight and Coke Company (the Engines driving same being under Galvanized Iron Covers). This Company have 30 of these Machines in use. They are also in operation at a great number of Gas and other Works in this Country and Abroad.

MARSHALL'S PATENT BATTERY CONDENSER & SCRUBBER.

This apparatus being made in sections, the capacity can be easily and cheaply made proportionate to increased make of Gas. Other advantages are: Large and effective cooling area on small ground space, slow speed, no repairs required, high strength liquor obtained, &c. Three of these Condensers now in course of construction, and can be inspected.

MARSHALL'S PATENT TAR-EXTRACTOR.

Extracts practically all the Tar without choking up, and gives minimum back-pressure.

These Machines are in use at Ilford, Antwerp, Copenhagen, &c.

3 & 4, Palace Chambers, Bridge Street, Westminster, S.W.

"CANNELINE"

FOR ENRICHING COAL GAS.

Superior to the very Volatile Hydrocarbons; requiring only a simple apparatus, at quite a nominal cost.

Coal Gas enriched by "CANNELINE" shows conclusively this Hydrocarbon is vastly superior to all other Enriching Agents, including Cannel Coal.

For all Particulars, apply to

S. BOWLEY & SON, Wellington Works, BATTERSEA BRIDGE, LONDON.

JOHN BROWN & CO., LTD., SHEFFIELD,

Proprietors of

ALDWARKE MAIN CAR HOUSE & ROTHERHAM MAIN COLLIERIES, NEAR ROTHERHAM.

ALDWARKE MAIN GAS COAL

Analysis: 12,600 feet of 19-candle gas per ton.

Weight of illuminating power in pounds of sperm, 820·80. Very free from impurities.

Telegrams: "ATLAS SHEFFIELD."

MOBBERLEY & PERRY

STOURBRIDGE.

Manufacture & supply best quality of

Gas Retorts (SEGMENTAL, HORIZONTAL, or INCLINED.)

Special Bricks & Blocks for GENERATOR & REGENERATOR FURNACES.

FIRE BRICKS, LUMPS, & TILES, BLUE STAFFORDSHIRE VITRIFIED BRICKS FOR PAVING, &c, &c.

EVERY REQUISITE FOR GAS-WORKS. Retort Setters sent to any part of the Kingdom.

Contractors for the erection of Retort-Benches complete.

London Agents:

BALE & HARDY, Gas Engineers and Contractors, BRIDGE HOUSE, 181, QUEEN VICTORIA STREET, E.C.

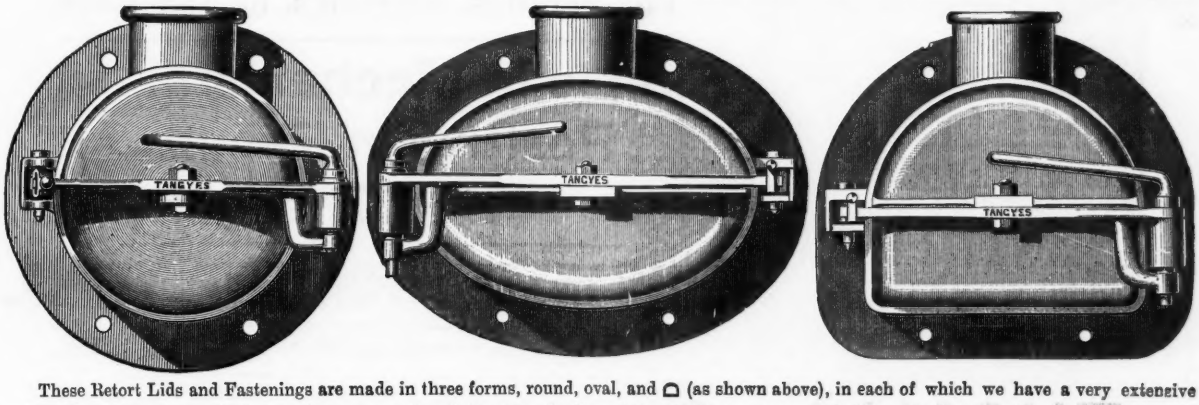
TANGYES LIMITED, CORNWALL WORKS, BIRMINGHAM;

AND AT

LONDON, NEWCASTLE, MANCHESTER, GLASGOW, SYDNEY, JOHANNESBURG, BILBAO, ROTTERDAM, & BELFAST.

MORTON'S SELF-SEALING RETORT-LID,

With Holman's Anti-Friction Catch, Self-Sustaining Cross-Bar, and Improved Eccentric Bolt.



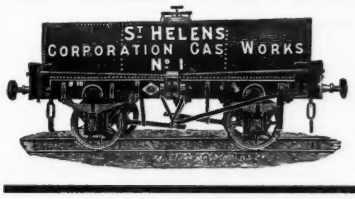
These Retort Lids and Fastenings are made in three forms, round, oval, and ⊓ (as shown above), in each of which we have a very extensive variety of patterns, from which Gas Engineers contemplating the adoption of these Lids are recommended to make their selection, in order to avoid cost of pattern-making, delays, &c., &c.

QUOTATIONS WILL BE GIVEN ON RECEIPT OF PARTICULARS OF REQUIREMENTS.

LIST OF PATTERNS ON APPLICATION.

Telegrams: "TANGYES, BIRMINGHAM." No. 90 E.

OIL GAS



BETTER TERMS CAN BE OBTAINED FROM SUPPLIERS OF OIL IF PURCHASERS HAVE THEIR OWN

TANK-WAGGONS.

HURST, NELSON, & Co., LTD.,

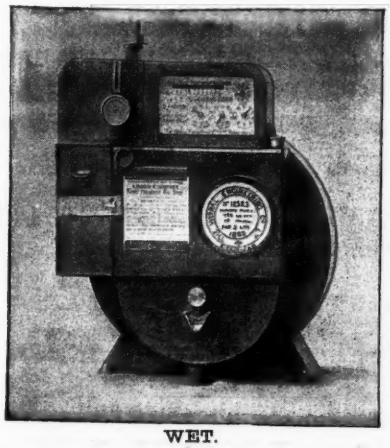
THE GLASGOW ROLLING STOCK AND PLANT WORKS, MOTHERWELL.

REGISTERED OFFICE:

27, ST. VINCENT PLACE, GLASGOW.

THE WIRRAL ENGINEERING COMPANY, LTD.

Patent New Prepayment Meters.

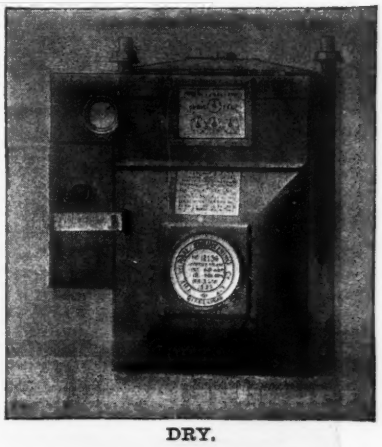


WET.

THE "PERFECT" AUTOMATIC.

Simple! Positive!! Accurate!!!

The only Prepayment Meter with no Springs, Counter-Balance, Weights, or Frictional Gearing to get out of order.

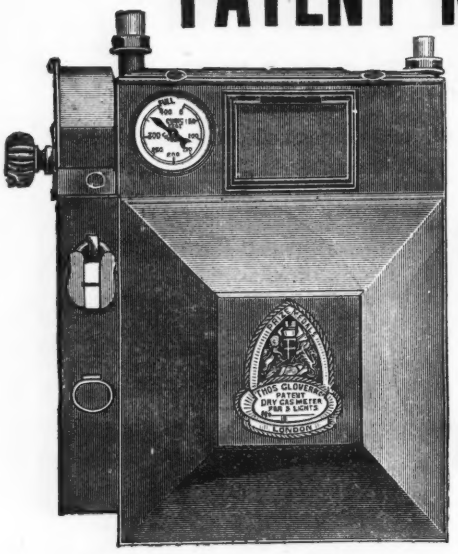


DRY.

Particulars on Application to the COMPANY, 76, Hamilton Street, BIRKENHEAD.

THOMAS GLOVER & CO.'S

PATENT NEW IMPROVED PREPAYMENT METER



For Pennies, Shillings, or any Coin.

Simple in Mechanism.
Positive in Results.
Price Changer *in Situ.*

GUARANTEED FOR FIVE YEARS.

Telegraphic Address: "GOTHIC LONDON." Telephone No. 6725.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 to 222, ST. JOHN ST., CLERKENWELL GREEN, LONDON, E.C.

BRISTOL:
62, VICTORIA STREET.
Telegraphic Address: "GOTHIC."

BIRMINGHAM:
3, BRIDGE ROW, DERITEND.
Telegraphic Address: "GOTHIC."

MANCHESTER:
37, BLACKFRIARS STREET.
Telegraphic Address: "GOTHIC."

W. PARKINSON & Co.

MANUFACTURERS OF

DRY METERS

OF THE VERY BEST QUALITY.

The **DIAPHRAGMS** are of the Finest **PERSIAN SHEEP SKINS.**

The **CASES** are of the Best **CHARCOAL-TINNED PLATES.**

WET METERS,

With PATENT THREE-PARTITION DRUMS.

STATION METERS AND GOVERNORS,
PRESSURE & EXHAUST REGISTERS,
MOTIVE POWER METERS,
Test Gasholders, Experimental Apparatus, &c.
PRESSURE-GAUGES OF EVERY DESCRIPTION.

NEW ILLUSTRATED CATALOGUE AND PRICE LIST
Sent post free on application.

COTTAGE LANE WORKS, CITY ROAD,
LONDON.
Telegraphic Address: "INDEX."

BELL BARN ROAD WORKS,
BIRMINGHAM.
Telegraphic Address: "GAS METERS."

CONTENTS.

EDITORIAL NOTES:—

GAS, LIGHTING, &c.— PAGE

The Folly of Trade Unionists . . . 575
Sheffield Gas Affairs . . . 576
The Address of the President of the British Association . . . 576
Two District Association Meetings . . . 576
Political Oil-Gas in Bradford . . . 576

WATER AND SANITARY AFFAIRS—

The Water Supply Question in East London . . . 577

ESSAYS, COMMENTARIES, AND REVIEWS:—

Gas and Water Companies in the Stock Market . . . 578
Electric Lighting Memoranda . . . 578
Water Acts for 1895—Second Article . . . 579
Gain-Sharing, &c. . . . 580
An Unfit Survival . . . 581

TECHNICAL RECORD:—

South-West of England District Association of Gas Managers—Half-Yearly Meeting at Barry—
General Business . . . 581
Proposed Amalgamation with the Southern Association . . . 582
Mr. S. W. Durkin on "The Want of Mutuality between the Various Authorities using the Subsoil of the Public Roads" . 582
Eastern Counties Gas Managers' Association—Half-Yearly Meeting at Wisbech—
General Business . . . 583
Discussions on—
Regenerative Systems of Firing for Small Works . . . 583
The Manufacture of Sulphate of Ammonia on Small Works . 585
The Incandescent System as Applied to Public Lighting . . 586
The British Association Meeting—The President's Inaugural Address . . . 587

REGISTER OF PATENTS:—

Reflecting Gas-Lights—Bray, G. . . . 589
Disc Engine, Suitable as a Water-Meter—Kent, W. G. . . . 589
Incandescent Gas-Burners—Redfern, G. F. (La Compagnie Parisienne du Bec Deselle-Gillet) . . . 589
Manufacture of Oil Gas—Mayer, F. . . . 589
Incandescent Mantles for Gas-Lamps—Crocker, S. H. . . . 589
Patent Notices . . . 590

CORRESPONDENCE:—

Regulation of Consumption in Incandescent Gas-Burners . . . 590

MISCELLANEOUS:—

The Dvorkovitz Oil-Gas Enrichment Process at Bradford—A Criticism of Mr. Lewis T. Wright's Report; A Warm Debate in the Town Council . . . 590
Sheffield United Gaslight Company . . . 594
Meeting of the Hertford Gas Company—Loss of the Company's Account Books . . . 594
Provincial Gas Companies . . . 596
Halifax Corporation Gas Supply—An Analysis of the Cost of Gas 597
The Public Lighting Contract for Weybridge—An Extraordinary Muddle . . . 597
Electric Lighting Notes . . . 597
Notes from Scotland . . . 598
Current Sales of Gas Products . . . 599
Coal Trade Reports . . . 599
Gas and Water Companies' Stock and Share List . . . 601

PARAGRAPHS:—

Appointment of a Consulting Chemist to the Bradford Corporation Gas Department—Resignation of Mr. T. Whimster, of Perth 577
Death of the Chairman of the Oxford Gas Company—The Recent Scarcity of Water in the East-End . . . 578
Mr. Sydney J. H. Willey . . . 581
Lectures on "Gas Manufacture"—The Autumn Meeting of the Incorporated Institution of Gas Engineers—Institution of Civil Engineers . . . 583
Suggested Purchase of the Kington Gas and Water Works by the Urban District Council—The Dorking District Council and the Water Company . . . 588
A Generous Offer . . . 590
Plympton and the Water Supply of Plymstock . . . 593
Welsh Water for London—Pontypridd Water Company's Supply 596
Projected New Schemes of Rural Water Supply—The Bolton Corporation and their Gas Stokers—Re-construction of the Truro Gas Company . . . 598
The Water Supply in East London—Ashton-in-Makerfield Gas Supply—Water-Works Extensions at Widnes—The Liverpool Water Engineer and his Salary—The New Water Scheme for Shrewsbury—The Purchase of the Odessa Water-Works by the Municipality . . . 600
Storage Extensions at the Birkenhead and Middlesbrough Corporations' Gas-Works—The Leeds Water-Works Extensions—Morley New Water-Works—Carlisle Corporation Gas and Water Accounts—The Kent Water Question—The Accounts of the Halifax Corporation . . . 601

TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

TO SUBSCRIBERS.

The JOURNAL is published every Tuesday, price 6d.; by post, 6½d.

TERMS OF SUBSCRIPTION.

One Year, 21s.; Half Year, 10s. 6d.; Quarter, 6s. 6d.

Payable in Advance.

If credit is taken, the charge is 25s. a year.

All communications, remittances, &c., to be addressed to

WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

Post-Office Orders should be made payable at the Chief Office, St. Martin's-le-Grand; Cheques crossed "Union Bank of London."

EDITORIAL NOTES.

The Folly of Trade Unionists.

THE disparagement we passed last week upon the so-called "work" done by the recent Trade Union Congress after the expulsion of the "independent of labour" element has been echoed in other journals—notably in *The Times*, which has published a leading article deploring the propensity of even the real Trade Union representatives constituting the purified Congress to waste their time, and make themselves ridiculous, by passing puerile resolutions, such as the one censuring the Emperor of Germany. So long as Trade Unionists assembled in public meeting continue to vindicate their independence, and exhibit their practical minds, in the committal of such-like absurdities, they and their cause will stand for little in the estimation of the rest of the community—just as they weighed for little at the general election. Yet though Trade Unionism only embraces a minority of the working-class population of the country, its professed adherents are numerous enough to be reckoned with as a social force, if they could but rally to, and act upon, some common policy qualified (by possession of elements of rationality and legality) to gain the assent of other orders of the body politic. The impotence of Trade Unionists as an order is due to the absence of any such policy from their Councils; and the insignificance of their Congresses, and of the individuals who rank as their leaders, is attributable to the incapacity of the latter to formulate a policy that will stand a moment's independent consideration. Trade Unionists are an army with many flag carriers and sergeant-majors, but no general; and the campaign in which they are supposed to be embarked for the amelioration of their order is devoid of a plan. Such an army can fight occasional soldiers' battles—in the shape of strikes; but it can never achieve a really decisive victory.

To take an example of the inability of the professional leaders in Trade Unionism to take a commanding view of the industrial position, let us look at the actual state of the coal-mining industry. While the delegates were vapouring away at Cardiff, facts connected with the Yorkshire coal industry were being published and discussed elsewhere, which—affecting, as they do, the very basis of the Trade Union system—were of vastly more importance to the supporters of these triflers than the verbal toys they were playing with. In an article appearing in the issue of the *Engineer* for the 23rd ult., upon the Yorkshire Miners' Association, there occurs the gravest aspersion upon the operation of Trade Unionism, as applied to coal miners, that has yet been promulgated in print. It is an exhibition of the insufficiency of Trade Unionism to secure a reasonable week's work to the miner, whatever it may do for the recognition of a nominally fair "living wage." The Yorkshire Miners' Association, it seems, have been forced to admit that the increasing output of coal in the district is coincident with low earnings by the pitmen. There is no mystery about it—although ever more coal is brought to bank, the increase in the number of workers to be paid for getting it is still larger. What is the reason for this? Simply that in their anxiety to get as many men as possible into the Union, the Executive accepted anybody and everybody who would take a ticket. When the miners were getting good wages, agricultural labourers and factory hands took on this job; and so long as they would consent to join the Union, the leaders did not object to them, for obvious reasons. Now it is found that the market is overstocked with labour; but what is to be done? New comers are as good Unionists as the old hands; and they cannot be turned out of employment for "Society" reasons. This is one of the things that Trade Unionism has done for the coal fields of Yorkshire; and it is no wonder that the men brought up to the trade are beginning to ask whether a numerous Trade Union is quite the same thing as a strong trade. The officials may prefer the former; but the workers are likely to find that the trade has been sacrificed to the Union. Our contemporary observes upon this head: "If something could be done at the source of origin "—in making the land worth cultivating, in order to keep "the farm-servant in the field, where he is at home—the "trend of surplus labour to the colliery workings would "be stayed, and the miner have more work every day, "and more wages at the week end. It is too late in the "day to talk of luring unskilled labour out of the pit. It

" is there, rapidly getting skilled, and already endorsed " by the Union regulations." There is the gist of the whole matter. In their solicitude to fill the Union, the leaders did not foresee the consequences of overfilling the pit. It is an illustration of their ineptitude in all matters of statesmanship. They can pass resolutions in favour of a legal eight-hours' day; but they cannot see when they are in danger of giving away the miner's chance of getting a full week's work.

Sheffield Gas Affairs.

THE half-yearly general meeting of the Sheffield United Gaslight Company was held on Tuesday last, when the Chairman, Sir F. T. Mappin, M.P., had a tale of progress to tell, as will be seen by the report of the proceedings in another column. There has been an increase of gas consumption in the district of 8·72 per cent. upon the output for the corresponding half of last year, which speaks well both for the undertaking and the state of trade in the town. The price of gas has been reduced by the substantial figure of 3d. per 1000 cubic feet. Yet, instead of the rental being about £12,000 less in consequence of the reduction—this being the sum representing the saving to the public—the revenue has only suffered from this cause to the extent of £2826. Residuals, of course, have returned less, with the single exception of tar. Yet the accounts show the remarkable result, which will be paradoxical to amateur critics of the gas industry, that in this undertaking the residuals have paid for the whole cost of the coal carbonized, and leave £924 to the good. If this is not a "scientific" way of utilizing coals, we should like to know of a better one. It certainly forms a strong contrast to the methods of central station electric lighting, with a consumption of coal of something like 7 lbs. per horse power distributed, and upwards, and no residual products at all. According to Sir Frederick Mappin, there is "no demand" in Sheffield for automatic prepayment meters; and he adduced what is certainly fair evidence to show that, without this aid to popularity, Sheffield gas is more abundantly used by the small householders of the town than is the case in any other place. We are not convinced, however, that the argument from this fact is as conclusive against the need for prepayment meters as it is good so far as it goes. Similar assertions as to the lack of demand for this kind of accommodation, have been made in regard to other districts before the introduction of the system, which is a peculiarly strong illustration of the manner in which supply creates demand. There is nothing else in the Chairman's address to call for comment here; and the meeting broke up after ample evidence had been given that Sheffield is well pleased with its gas supply, and the proprietors of the Company with the administrators and managers of their fine undertaking. There is indeed no Company in England better qualified to afford the student of the industry "object lessons" in gas manufacture and supply than the Sheffield Company.

The Address of the President of the British Association.

THE British Association Meeting this year has so far been pursuing a mildly interesting and comparatively uneventful course. The inaugural address of the President, Sir Douglas Galton—an extract from which appears elsewhere—was mainly of the chronicle type, which in itself almost forbids escape from the commonplace, and easily descends to the trite and tedious. In this instance, however, circumstances constrained the President, who has for twenty-four years laboured well for the Association as its General Secretary, to submit to the world a case in proof of the progress made during this period of time by science, with the aid and countenance of the organization of which he has so long been a principal stay and guide. As an engineer, Sir Douglas Galton looks at science generally from the engineering standpoint, which is at the same time that of trained, practical commonsense; and for this reason engineers will find themselves much in sympathy with the views expressed in his address respecting a great variety of subjects lying outside the range of their professional interest. Of engineering itself, however, the address contains very little. The President touched upon several sanitary questions; and he took the opportunity for pointing out how little has been done in the way of aërial sanitation. Speaking of fogs and fog prevention, he declared to his audience that we shall continue to "suffer from fog " so long as you keep refuse stored in your towns to furnish " ammonia, or so long as you allow your street surfaces to " supply dust, much of which consists of powdered horse " manure, or so long as you send the products of com- " bustion into the atmosphere. Therefore, when you have " adopted mechanical traction for your vehicles in towns, " you will largely reduce one cause of fog. And if you " diminish your black smoke, you will diminish black " fogs. In manufactories, you may prevent smoke either " by care in firing, by using smokeless coal, or by washing " the soot out of the products of combustion in its passage " along the flue leading to the main chimney-shaft. The " black smoke from your kitchens may be avoided by the " use of coke or of gas." But, so long as the hygienic arrangement of the open fire in living-rooms is retained, Sir Douglas Galton despairs of finding a fireplace, however well constructed, which will not be used in such a manner as to cause smoke—unless, indeed, the chimneys were reversed, and the fumes drawn into some central shaft, where they might be washed before being passed into the atmosphere. This is a very fair summary of the case for domestic smoke prevention, as it stands at the present day, albeit the President might have laid more stress upon the advantages of gas for warming dwelling houses and places of business situated in crowded localities. It was an unexpected recommendation of mechanical, as a substitute for horse, traction in towns, that it would tend towards the reduction of fogs; and the point, although novel and striking enough for a presidential address, is hardly likely to bear strongly upon the development of the principle of traction referred to. We cannot at present do more than allude to the sectional addresses and the papers read at the meeting. Abstracts of such of these as may be of special interest to our readers will be given in the JOURNAL in due course; and the addresses will in some instances form the subject of future comment.

Two District Association Meetings.

Two District Associations of Gas Managers held meetings last week in diametrically opposite localities—the South-Western Association at Barry, near Cardiff; and the Eastern Counties Association at Wisbech. For some reason, however, which may possibly be partly divined, neither gathering can be described as doing great credit to the organization represented by it. Our reports of the proceedings at these meetings show that those who attended them did not receive much by way of reward for their trouble; and—with all good will towards the idea of gathering the gas managers of districts together by means of these organizations, be it said—it will evidently be necessary that more inducements to attend such meetings should be forthcoming if they are not to fall into desuetude. The South-Western meeting was very poorly attended; and the business suffered accordingly. Mr. S. W. Durkin read a short paper, which was not discussed; and a most significant part of the proceedings consisted in the unanimous adoption of a resolution in favour of the proposed amalgamation of the Association with the Southern District Association of Gas Engineers and Managers. This is the first movement of the kind that has been signalized in connection with district gas managers' societies; but it will probably not be the last. It is one thing to start an organization of this nature, and a totally different matter to keep up interest in it after everybody has passed the chair, and everybody else has been through the Committee, and there is nobody left to "draw" for a paper. From one point of view, the disappearance of the South-Western Association as a separate and distinct organism would be most regrettable. But, on the other hand, if it cannot be kept in full and beneficent activity, it would be better to dissolve or fuse it, than allow it to drag on an invalid existence. Those of its members who might pass over into the Southern Association would find a hearty welcome amid friends, and would, perhaps, in the majority of cases have not much farther to go to the meetings than when these were supposed to be fixed with regard to south-western exigencies. This has always been a straggling district—awkward to work; and London would be as convenient a centre for the combined South of England Associations as could be suggested for either separately.

Political Oil-Gas in Bradford.

THERE has been a tremendous amount of fuss in a small way in Bradford municipal circles—the word sounds better than "rings"—over the question as to whether or not the

Dvorkovitz oil-gas experiment at the Thornton Road Gas-Works should be discontinued or kept on for a further period to demonstrate, more clearly than has yet been done, its utility or the reverse. The Gas Committee have for some time been divided in opinion upon the matter; and they have employed several experts in gas to help them to make up their minds about it. Unhappily, the result has so far only been to exhibit the unedifying spectacle of the "doctors" differing among themselves; and the Committee have been practically left to draw their own conclusions in the business. It seems odd, upon the face of it, that there should be any difficulty in ascertaining the value of a gas manufacturing process which is open to actual test alongside an alternative system with which it is to be compared. But such is the Dvorkovitz case, as it stands at present. Certainly, the majority of the Gas Committee, who met to consider the matter on the 4th inst., had little difficulty in disposing of the question—reports and all. This meeting had before them Mr. Lewis T. Wright's opinion of the process, and Mr. Wood's criticism of this verdict; and in addition there was a very "sporting offer" from the agent for the patentees, to work the plant for another six months upon conditions more than fair to the Corporation. But the meeting scorned the offer, and resolved (by 10 votes to 2) to abandon the process and order the removal of the plant. This was, at any rate, a decision. But, when the matter came in due course before the Town Council, the resolution of the Committee was sent back for reconsideration by a vote of 23 to 22. This seems a fair thing to do in the circumstances, irrespective of the merits of the process itself. The vote of the Gas Commitee was alleged to have been somewhat of a "snatch;" and it is admitted that the offer under which the experiment could be prolonged contained ample protection for the interests of the Corporation. It is always a mistake, and often a pity, to be hasty in terminating an experimental process that has had at least sufficient *primâ facie* success to render its discontinuance disputable as a matter of policy. Limbo yawns wide enough for failures, and will not be deprived of its own in the end. One of the funniest aspects of this Bradford gas-carburetting controversy—which developed enough heat in the Council meeting to carbonize most of the oil of mutual forbearance that usually lubricates the passage of business through this respectable local authority—is that the Council vote was cast upon strict party lines. It is locally reported that "a Conservative majority" was established in the Gas Committee last November; and that when the proceedings of the Committee are brought before the Council, any question (technical or otherwise) concerning them is settled by the strictest of party divisions. Now it is stated publicly that, since the Conservatives on the Gas Committee will have nothing to do with the Dvorkovitz process, this body will simply ignore the reference of the Council in the matter. The Liberals in the Council, it appears, are not strong enough to overrule, and they are not united enough to outmanœuvre their political opponents; so that the net result of all this voting and countervoting is that the Dvorkovitz process will remain in abeyance, so far as Bradford is concerned. It is admitted in the local press that there is nothing in this political scheming that relates to the merits or demerits of the process; "but in the present state of "affairs that seems to be a matter of minor importance." Such is municipal gas-works administration as understood in Bradford.

Appointment of a Consulting Chemist to the Bradford Corporation Gas Department.—Among the minutes of the Gas Committee adopted at last Tuesday's meeting of the Bradford Town Council was one appointing Mr. F. W. Richardson as Consulting Chemist to the department for one year, at a salary of £100. Referring to this engagement, the Chairman of the Committee (Mr. W. C. Dixon) remarked that Mr. Richardson had been highly recommended as a very clever young man, whose services would be invaluable to the Corporation in connection with the chemical works. The Council, he said, would be aware that at the gas-works a large quantity of sulphate of ammonia had been stored recently; and there was a chance now that the Corporation—by having the help of some scientific man, who could go into the whole matter and assist their Manager—might be able to turn this sulphate of ammonia into various other commodities of a very valuable kind. Already some of the sulphate of ammonia had been made into muriate of ammonia; and the difference between the two was that £26 was the price obtained for the muriate as against £9 7s. 6d. for the sulphate.

WATER AND SANITARY AFFAIRS.

It is officially announced in a letter to Mr. Crookenden that Colonel W. M. Ducat, R.E., one of the Engineering Inspectors of the Local Government Board, and Dr. F. W. Barry, one of the Medical Inspectors, have been deputed to hold the public inquiry into the water supply of East London which has been ordered by Mr. Chaplin. General Scott may be supposed to prefer this arrangement, foreseeing that, if he conducted the inquiry and found that the East London Company were not to blame, his report would be challenged as the fruit of a friendly feeling towards the water interest. But Colonel Ducat must not expect to go free, should he fail to find the Company guilty of the dire offences laid to their charge, especially if he should feel it his duty to point out the extent to which the County Council were the cause of the difficulty in which the East London Company recently found themselves placed. Not even Mr. Chaplin could escape attack on the subject of the water supply, the moment it was discovered that he desired to master both sides of the question. The Progressive party still manage to hold the reins of the County Council, though not able to drive quite so fast as they could wish. Mr. Henry L. Cripps, the Council's Parliamentary Agent, writes long letters to *The Times*, clearly showing what, in his opinion, is still the ruling policy at Spring Gardens. Lord Onslow gravely rebukes this pertinacious scribe for continuing "an "*ex parte* statement calculated to prejudice the case of a "Company whose action is now the subject of Govern-"ment inquiry, possibly fraught with the gravest conse-"quences to the shareholders." Mr. Cripps is reminded that he is in the receipt of "a fixed salary" from the Council, and that his "unauthorized action" will not escape criticism when the Council meet after the recess. But Mr. Cripps both knows his business and his masters, and may be trusted to guide his pen wittingly, so as to serve the cause he has in view. Lord Onslow will not silence him. Strange assertions are made; and old fallacies are repeated. Mr. Cripps maintains that the Bill brought in by the East London Company "did not authorize the "construction of any new works at all." This is certainly a startling statement, and is positively puzzling when Mr. Cripps goes on to say that the principal proposal of the Bill was "to give power to the Company to create "additional debenture stock to the extent of £500,000." The objection is urged that "no plans and sections of "any new water-works" were deposited. We are not aware that there was any necessity for depositing such plans and sections. That new works, or the extension of old ones, was the occasion of more capital being required, was understood throughout. Mr. Cripps himself says it was "suggested on behalf of the Company" that, unless the Bill was passed, they might be "unable to "supply sufficient water." But he brings forward the absurd argument that, because, in a statement addressed to the Royal Commission in April, 1892, the Company declared "their ability to furnish water adequate in "quantity and excellent in quality for the period of forty "years," therefore the Company had, on their own confession, no need to construct new works, or only such small matters as could be paid for out of revenue. According to this showing, the Company's works may practically suffice for the next forty years. The fallacy has been exposed before. But it still survives; and we suppose there are people who believe it. We may refer to an excellent letter from "A City Solicitor" published in *The Times* of Friday last, in which the writer exposes a considerable amount of inconsistency both on the part of the County Council and Mr. Cripps. Another correspondent says: "The audacity "of Mr. Cripps is unbounded," and challenges the champion of the County Council to prove his *ex parte* statements. We fear that this opens up an endless prospect; and, in the meantime, we are thankful for a small mercy, in respect to the Poplar Vestry—the conference on the water question which had been proposed by that body having fallen through, from the circumstance that only three authorities thought it worth their while to send representatives. So, for the present, the matter rests in the hands of Colonel Ducat and his colleague.

Resignation of Mr. T. Whimster, of Perth.—Our Edinburgh Correspondent reports the resignation of Mr. Thomas Whimster, of his position of Gas Manager at Perth (see p. 598).

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 601.)

THE course of things on the Stock Exchange last week was considerably chequered. Pretty well everything opened buoyant and lively all round; and it looked as if there was going to be a boom in the South African market. But the movement received a prompt check. The account open for settlement was very heavy, and caused some apprehension. Rates for carrying over were made very stiff; and enforced closing pulled prices down. Other markets also suffered, especially the American; and, in fact, hardly anything but the very choice stuff held its own through the week. The Money Market had its usual temporary stimulus from the requirements of the Stock Exchange; and lenders were rather cautious. Business in the Gas Market was animated; the big issues being particularly active. Prices were very good; and several leading quotations rose freely. General firmness characterized all the rest. Gaslight "A" was largely dealt in; and, starting at a little better than 294, it pushed steadily up till it was done more than once at 299. But it never could quite touch the level 300. All the secured issues were quite neglected, except the "H" limited, which made a big jump of 5. South Metropolitans were very quiet, but ready to rise. The "B" advanced its qutotation, and changed hands at a bare fraction under 310; the buyer being thus content with £3 17s. 6d. per cent. for his money. Very little was done in Commercials; but that little marked top price. Suburban and Provincial Companies were again more than usually quiescent; hardly a transaction being effected in them all the week. Their quotations, too, were left unchanged. Of the Continental undertakings, only Imperial exhibited any activity. The price showed a slight tendency to harden; and the quotation was put up a point. But there was not much sign of any latent strength. There was a good bit of movement among the rest. San Paulo was in demand at an advance; Ottoman rose *ex div.*; and Bombay had a further rise. Why the latter should be put on a level in point of value with South Metropolitan "A" and better than Commercial, Brentford, and other home stocks is not quite evident. Australians were put down a point, having been too freely lifted the week before. Among the Water Companies, there was a fair amount of business in East London, which recovered a point.

The daily operations were: The Gas Market opened quite lively on Monday, especially for Gaslight "A" and Imperial Continental. The former advanced 1; and ditto "H," 4. Business was almost as brisk on Tuesday; and prices again rose freely. Gaslight "A" improved 2; ditto "H," 1; South Metropolitan "B," 3; and Imperial Continental, 1. On Wednesday, transactions were considerably reduced; and prices remained about the same. Both Bombay issues advanced ¼. In Water, East London recovered 1. On Thursday, business was quiet as a rule; but there was brisk dealing in San Paulo. Quotations remained unchanged. There was just a shade more activity on Friday; and San Paulo advanced ½. Saturday's dealings were not remarkable; but the buying price of Gaslight "A" was advanced 2. Australian debenture relapsed 1.

ELECTRIC LIGHTING MEMORANDA.

Electricians in the Bankruptcy Court—The Health of Telegraphists: A Query for Mr. W. H. Preece.

THOSE who desire accurate and complete information respecting the condition of the electric industries will be well advised to keep an eye upon the reports of bankruptcy proceedings in town and country. From time to time, electric construction and installation companies are ordered to be compulsorily wound up; and the number of electric lighting and engineering firms who have had to seek the protection of the Court is large and constantly increasing. One can hardly pick up an electric journal without noticing, among the paragraphs of general news, reports referring to proceedings of this kind. From the frequency with which such news appears, it may be gathered either that the trade in electricity is in a bad way, or that the number of people who have gone into it is altogether in excess of the real commercial demand. To cite only one instance, the issue of the *Electrician* for the 30th ult., under the heading "Trade Notes and Notices," mentioned one way or another the financial troubles of half-a-dozen companies and trading firms by name, and referred to the obscurity which enshrouds the fate of "several other concerns." This does not look well for the electric industries. Not the least of the troubles arising out of these failures are those which the breaking up of so many firms, and the notoriously shaky state of many others, bring upon those which still manage, by hook or by crook, to keep in a fairly sound position. It was observed in the last annual report of the Receiver General in Bankruptcy how the reckless trading of firms knowing themselves to be insolvent, works havoc with their respectable competitors in the same line of business. With all their capital hopelessly lost, and without hope of being able to do more than continue to pay directors' fees and management salaries for a little while longer, these tottering firms take contracts at losing prices, and sell their manufactured goods for whatever they will fetch. The consequence of this particular form of commercial immorality, which is one of the cankers of the age, is that honest traders cannot get work to do at fair prices. In no trade is this evil greater than in the new, glorious, scientific, and admired electric industry of the United Kingdom, which is so often acclaimed in the newspapers as one of the triumphs of our material civilization. So it doubtless is, to an extent; but all this high scientific and progressive character does not prevent the industrial aspect of electricity in these days from being seamed with the worst of the diseases of the commercial system.

A recent issue of a medical contemporary deals with the sanitary aspect of the case that has been prepared by the telegraphists in the service of the Post Office against the administrative rules imposed upon them. It appears that the grievances of this body of public servants are neither few nor small; as will be generally conceded when it is known that their rate of mortality from phthisis is actually greater than that of the Sheffield grinders—a trade which has hitherto shown the worst record for diseases of the respiratory organs. According to a tabular statement prepared by a representative of the service, the ratios of mortality from phthisis alone for adult Englishmen, between the ages of 15 and 55, are: Telegraphists, 46·6; Sheffield grinders, 33·1; adult males generally, 13·8. Now the Chief Engineer to the Post Office is, as all the world is being frequently reminded by his public appearance in other capacities, Mr. W. H. Preece, F.R.S., &c. These matters may be supposed to occupy the attention of this eminent person in the intervals of his consulting practice in regard to the installation of municipal electric lighting stations. He has, indeed, testified to the fact of the health of the employees of the telegraph department of the General Post Office being a matter of solicitude with him, inasmuch as it is now some years ago that he vouched for the circumstance of the introduction of electric lighting into this establishment having greatly improved the condition of the operators in this respect. There seems, however, to be plenty of room for still further improvement on the same lines, if these recent reports are to be credited. Perhaps Mr. Preece will look into the matter, and furnish the world with some duly accredited fresh statistics in support of his recorded declaration. Statistics are not his strong point; but the matter at issue is so serious that the authorities of the Post Office ought to take steps for setting the public mind at rest as to the telegraphists' condition. We, of course, know that, in common with that of every other Government department, the administration of the Post Office is not perfect; but there must yet be a considerable section of the public of this country who would be pained to think that our sixpenny telegrams are partly paid for by the lives of sacrificed fellow men. The suspicion is disturbing, as it is; and no Government office can rest under it for a moment longer than the meeting of Parliament. The authorities of St. Martin's-le-Grand will certainly be well advised to have the matter cleared up before then. What we are particularly concerned to know is, how the subject stands affected by the lighting question, in view of Mr. Preece's assertions in this connection. Perhaps our electric contemporaries will be so good as to take notice of this inquiry, and assist in demanding further and fuller information. Honestly and truly, we believe that the sanitary state of the instrument-rooms at the General Post Office would be condemned by any unofficial medical inspector, on the grounds of overcrowding, lack of proper ventilation, and disregard of the natural comfort of the operators who swarm in them in their thousands, night and day. Something more than the substitution of electric for gas lighting is required to render such a hive reasonably healthy, to say nothing of making it pleasant to work in.

Death of the Chairman of the Oxford Gas Company.—We regret to have to announce the death, on Thursday last, of Alderman J. Hughes, J.P., who, for fifteen years, has been the Chairman of the Oxford Gas Company. He was a most influential man in civic matters for a long period of years. As far back as 1859, he was appointed a member of the Corporation, and was elected Chief Magistrate of the city no less than six times. In 1884 (which was one of his years of office), he was largely instrumental in obtaining a Special Act of Parliament for improving the water supply of Oxford.

The Recent Scarcity of Water in the East-End.—The Local Government Board last Thursday addressed letters to the East London Water-Works Company and the Hackney Vestry, relative to the forthcoming inquiry into the recent scarcity of water in the East-End, saying the proceedings will take place at the Hackney Town Hall, on the 1st prox., before two of the Board's Inspectors—Colonel W. M. Ducat, R.E., and Dr. F. W. Barry. Mr. I. A. Crookenden, the Secretary of the East London Water Company, in reply to inquiries on Saturday afternoon, said the Company had completely succeeded in overtaking the waste which undoubtedly occurred in some districts in the early part of the week. As the result, they were able to keep on the continuous supply, which was commenced the previous Sunday morning, and even in the highest levels now the consumers had no ground whatever for complaint. Everywhere the supply of water was abundant; and complaints were now quite the exception.

WATER ACTS FOR 1895.

THE following Acts of Parliament relating to water supply have become law this year:—

The Bridlington Water Act incorporates a limited Company formed in 1865, under the name of the Bridlington and Quay Water Company, for supplying the towns of Bridlington and Bridlington Quay and the adjoining parishes and district, all in the East Riding of Yorkshire, with pure spring water. The present capital of the Company consists of £20,000 (all of which is subscribed, and £17,504 paid up), together with a mortgage debt of £400. The name of the Company is changed to that of the Bridlington Water Company; and the capital is increased to £40,000, by the addition of £20,000 of new 4 per cent. capital, with the usual borrowing powers. None of the new capital is to be issued within a period of two years after the passing of the Act, nor more than £3000 borrowed on mortgage except for the purpose of replacing existing debentures. The rate for domestic supplies is to be 5 per cent. on rateable value, with extras, payable in advance by half-yearly instalments. Water is to be supplied for public purposes in Bridlington at the price of 6d. per 1000 gallons. Water may be supplied by meter for other than domestic purposes. A penalty of £5 is enacted for the tapping of mains by any unauthorized person. The Commissioners of Bridlington Harbour may be Directors of the Company; and, similarly, shareholders of the Company may hold the Commissioners' office. At any time after the passing of the Act, the Bridlington Urban District Council may acquire the undertaking, provided that if notice of purchase shall be given to the Company before the expiration of five years from the passing of the Act, the purchase is to be deemed compulsory, and the costs of obtaining the Act are to be added to the price. But the price is not to be enhanced by reason of the Company having obtained statutory powers. If, however, notice is given at a later period, such costs are not to be added to the price, and the purchase is not to be deemed compulsory. The necessary financial arrangements for the purchase are included in the Act; the purchase money being repayable in fifty years.

The Cranbrook District Water Act incorporates a Company with a capital of £15,000 in £1 shares, carrying the usual borrowing powers, for the supply of water to and in the parishes of Cranbrook, Goudhurst, and Hawkhurst in Kent. Parts of the district were included in the area defined in the South Kent Water Act, 1889; but the Company having neglected to exercise their powers in this regard, they are repealed. It is provided that if, after the expiration of six years from the commencement of the Act, the Company are not affording a sufficient supply in any local government district within their limits, the local authority of such district may provide a supply in accordance with the provisions of the Public Health Act, or any company or person may apply for an Act or Provisional Order for the same purpose, as if no Company were authorized by this Act to supply water therein. The authorized works comprise a well and pumping-station to be situate in the parish of Hawkhurst, and a service reservoir in the parish of Cranbrook. Clauses are inserted for the protection of the county roads and the Cranbrook and Paddock Wood Railway Company. The land is to be acquired within three years, and the works completed within five years from the passing of the Act. Rates for domestic supplies are to range from 8 to 6 per cent. on rateable value. Water may be supplied by meter for domestic or other purposes.

The Felixstowe and Walton Water Act incorporates a Company formed in 1894 to supply with water the district of Felixstowe and Walton, in Suffolk, and the neighbourhood, and of acquiring any water-works then existing and supplying water in the district. The present share capital of the limited Company consists of £50,000, divided into 5000 £10 shares, of which 3491 are subscribed and 2451 fully paid up. The remaining 1040 shares, on which only £2 each has been paid up, are held only in fives; and there is no debt. The limits of the Company are defined, subject to liberty to local authorities and others to supply any district not supplied within five years by the Company. The capital of the Company is fixed at £50,000, whereof £26,590 is the original, and the remainder is additional capital. Dividends are limited to 7½ per cent. on the old, and 7 per cent. on the new capital. The usual borrowing powers are granted. It is provided that the Company shall not (except with the consent of the Felixstowe and Walton Urban District Council) raise any capital under the provisions of the Act—except for current capital requirements—until Dec. 21 next; and if the Council shall introduce a Bill into Parliament and *bonâ fide* promote the same in any of the three next available sessions, to enable them to purchase the undertaking of the Company, the same restriction shall apply during the promoting of the Bill, which is not to be opposed by the Company except upon clauses for their own protection. Any such transfer is to be on such terms as may be agreed upon, or determined by arbitration. The works consist of a pumping-station in the parish of Frimley St. Mary, and a pumping-station and water-tower in the parish of Felixstowe. Rates for domestic supply are to range from 9 to 6½ per cent. on rateable value—inns to pay the highest rate. Public institutions are to be supplied by meter at the specified charges of 2s. and 1s. 6d. per 1000 gallons.

The Bristol Water-Works Act enables the Company to raise £350,000 of new capital by the creation and issue of ordinary shares or stock. The time limited by the Act of 1888 for the completion of certain works is extended. Additional lands for the protection of the supply are to be acquired by agreement, subject to certain conditions inserted for the protection of the Trustees of the Bristol Municipal Charities. The Brymbo Water Act authorizes the Company to raise £16,000 of additional capital, bearing 7 per cent. ordinary, or 5 per cent. preference dividend, with the usual borrowing powers. The time allotted in the Company's Act of 1888 for the completion of certain authorized works is extended. The York Water-Works Act empowers the York Water-Works Company to raise £60,000 of additional capital bearing 3½ per cent. dividend. The limits of supply sanctioned by the Company's Act of 1846 are defined and extended. Payment of back-dividends is prohibited for any year prior to June 30, 1888, or after June 30, 1894. The Company's contingent fund (limited by the Act of 1846 to £5000) is enlarged to £10,000. Future loans are to be raised at not exceeding 3½ per cent. interest. Water is to be supplied to the York Corporation for public purposes free of charge, as from the beginning of next year. In place of the provision of the Act of 1846 bearing upon the liability of the Company to supply water, it is now enacted that "the Company shall, at the request of the owner or occupier, furnish to every occupier of a private dwelling-house or part of a private dwelling-house in any public street or road near to which any main or branch pipe of the Company shall be laid, a sufficient supply of pure and wholesome filtered water for all domestic uses" at certain scheduled rates. The rates prescribed in the Act of 1876 for the supply of water for trade purposes are reduced by 5 per cent. for supplies within the city. Special rates are scheduled for "small trades." Subject to certain conditions, the Corporation are to take water for flushing tanks free of charge. Hydrants are to be substituted for fire-plugs. The Whitby Water Act empowers the Company to raise £12,000 of additional 7 per cent. capital, with the usual proportion of loan. Certain works as to the legality of which doubts have arisen, are sanctioned; and the acts and expenditure upon them confirmed. A scheduled agreement, having regard to a grant of water rights, is confirmed and made binding upon the parties. These rights apply to the water of the Hazel Head Springs, which are tributary to the River Esk. The new works are to be completed within four years. In the event of the undertaking of the Company being acquired by the Whitby Urban District Council, the capital raised under this Act—except that applied for authorized purposes—is not to be deemed to have increased the capital value of the undertaking or to be the subject of compensation or purchase.

The Ambleside Urban District Council (Gas and Water) Act provides that the water-works belonging to the Ambleside District Gas and Water Company shall be acquired by the Council at a price to be ascertained by arbitration—being valued separately from the gas undertaking, and thereafter kept distinct. The limits of supply for water are the district of the Council. The works comprise a dam and intake in the stream called Scandale Beck, situate nineteen chains up the stream from Low Sweden Bridge, and a covered water-tank in the parish of Grasmere. Additional lands constituting the watershed of the stream are to be acquired. The rate for domestic supplies is to be 5 per cent. on rateable value, with extras. Water may be supplied for domestic or other purposes by meter. Clauses are inserted for the protection of the Manchester Corporation in regard to their Thirlmere supply. In addition to the price of the undertaking, the sum of £6000 is to be raised for the purchase of land and the extension and improvement of the works. The Brighouse Corporation Act provides, among other things, that the water undertaking is to continue vested in the Corporation. A scheduled agreement with the Halifax Corporation dealing with the purchase of water in bulk from the Corporation is confirmed. The part of the borough known as Hove Edge is severed from the Halifax water limits. The Brighouse water limits are to be the borough. Not more than 20 acres of additional land are to be purchaseable by the Corporation, by agreement, for water-works purposes. Rates for domestic supplies are to range from 8 to 6 per cent. upon rateable value, with 10 per cent. for all inns or hotels, whether public or private. Water may be supplied for domestic or other purposes by meter. The sum of £10,000 is to be borrowed for the part payment of the principal moneys payable by the Corporation under the scheduled agreement and the extension and improvement of the water-works. Separate accounts of the water undertakings are to be kept.

The Chesterfield Gas and Water Board Act constitutes a Joint Board representing the Corporation of Chesterfield and the Urban District Councils of Whittington, Newbold, and Dunston, with the object of acquiring compulsorily the water undertaking of the Chesterfield Water-Works and Gaslight Company. The agreement or award is to state the amount of the purchase money attributable to the water undertaking. Conditions are inserted with regard to the supply of water by the Board to parishes outside the limits and within the jurisdiction of the Chesterfield Rural District Council. The Council have the right of purchase over parts of the undertaking so situated; but inasmuch as, in order to afford a proper supply to the parishes, additional works will have to be executed by the

Board, it is provided that the Board are to give notice to the Council of their resolve to construct such extensions, and require the latter to exercise the right of purchase. In the event of the Council refusing to take action upon such notice, the power of purchase in such case is to be suspended for 15 years. The sum of £15,000, besides the purchase money, is to be borrowed for water-works purposes. Surplus water revenue is to be applied in reduction of the rates for domestic supplies. Temporary financial assistance may be afforded by the water to the gas undertaking, and *vice versâ*.

The Clonmel Corporation Act contains provisions enabling the Corporation to supply water to consumers within one mile outside the borough, upon such terms as may be agreed on. The Edinburgh and District Water-Works (Additional Supply) Act enables the Trustees to construct additional works, comprising reservoirs in the parishes of Tweedsmuir and Liberton, with the object of obtaining a further supply of water from the River Talla, subject to the immediate duty of discharging down the stream compensation water at the rate of not less than four million gallons daily. During the ensuing seven years, observations of the amount of rainfall in the drainage area of the reservoir are to be taken; and thereafter one-third of such amount is to be discharged regularly and continuously as the corrected amount of compensation water. The undertaking of the Liberton Water-Works Company, Limited, is to be taken over by the Trustees at the price of £3375. The additional capital sum of £750,000 is to be borrowed by the Trustees. The Merthyr Tydfil District Council Water-Works Act authorizes the Council to construct an additional reservoir for impounding the waters of the Tâf Fechan. Certain compensations are to be provided to the commoners whose rights will be affected by the operations authorized by the Act. The construction of the existing Neuadd reservoir is confirmed. Rates for domestic supplies are to range from 8 to 7 per cent. upon rateable value. The sum of £120,000 is to be borrowed for water-works purposes.

"GAIN-SHARING, &c."

In last week's number of the JOURNAL, passing mention was made of the issue by the Labour Department of the Board of Trade of a new report* by Mr. D. F. Schloss, of this department, as a supplement to his report on "Profit-Sharing," recently presented to Parliament, and commented upon at the time in these columns. The methods now dealt with by Mr. Schloss, are explained by Mr. H. Llewellyn-Smith, the Commissioner for Labour, as being systems of remuneration for labour (often confounded with profit-sharing) under which the employees are offered a bonus or premium not dependent upon the rate of profit earned by the business, but upon the saving effected upon a specified standard cost of production. It has been thought convenient to treat such schemes separately from profit-sharing; and the present report is believed to contain the first systematic account of them which has been published. This statement is a sufficient recommendation of the report to all interested in the labour question.

The difference between profit-sharing and "gain-sharing," as Mr. Schloss has happily called those systems which form the subject of inquiry on the present occasion, is fundamental. In any scheme of profit-sharing properly so called, the employee receives, in addition to his ordinary wages—the point is to be insisted upon, with reference to past controversy upon this head—a share of the profits of the business in which he is engaged. Under the systems now being considered, "systems which have been otherwise designated under the general name of progressive wages," the employee receives, as an incentive to the display of a special degree of efficiency, a bonus the amount of which is not governed by the profits or losses of the business as a whole, but is strictly proportionate to the extra activity, carefulness, and intelligence displayed by himself, measured by the reduction effected in the cost of production as compared with certain standard costs. "Thus, if the execution of a given piece of work usually occupies five hours, the workman may be told that, if he can get the job done in four hours, he shall receive by way of premium, in addition to the price of four hours' labour, reckoned at his accustomed rate of pay, the whole, or a definite fraction of the price of the time saved by the more than normal degree of efficiency which he has exhibited." This, in its most simple form, is an example of individual progressive wages; while the offer of a joint premium calculated upon the same principle to a group of workmen working together, would be an instance of collective progressive wages.

It must be admitted that the principle herein illustrated appears at first sight a more natural development of the wages system than profit-sharing. It is so, in fact; inasmuch as it appeals to the beneficiary in precisely the same way as the gains of business offer themselves to the employer himself. Apart from accidents, it is a truism to state that the gains of business to the business man will usually be very much what he can make them by his ability in, and attention to, his business. The apparent simplicity and directness of the principle, however, as applied to the remuneration of special efficiency in the workman, really conceals a good deal of difficulty and complexity in execution; and it has the great drawback of being at best of but temporary and passing operation. A moment's consideration also will show that the securing of gain, at any rate immediately, is not the complete purpose of the employer or head of a business possessing a permanent character. He has rather to build up and fortify his business, and much both of his work and care are not rewarded by actual gain, either present or deferred. So with the progressively-paid workman. After all, progressive wages are but wages—really a modification of payment by the piece—and no system of the kind can be held to be other than an attempt to cure one of the most glaring evils of the wage system without changing its nature or the status of those who are subject to it.

To return, however, to Mr. Schloss. He has to tell of six schemes of gain-sharing, which differ from one another in many details, but may be taken to embody the leading features of the type of industrial method in question. The first of these six schemes is one that was introduced some years ago—eight years, to be precise—by the Yale and Towne Manufacturing Company, of Stamford, Connecticut, who are makers of the well-known locks and cranes bearing their name. The second is in force in a Canadian factory, manufacturing rock drills, air compressors, and so forth. The remainder are English examples; the most important being the "Reference Rate" system of Messrs. Willans and Robinson, of Thames Ditton, and the "Good Fellowship" plan adopted at the Thames Iron-Works. The first scheme was described in a paper read by its author, Mr. H. R. Towne, before the American Society of Mechanical Engineers, and reprinted in full in the report. We cannot attempt to give particulars of this interesting experiment; but as it has since been abandoned in favour of a piece-work system, it must be regarded as having condemned itself. The workpeople and the employers both derived some advantage from it while it lasted. But the practical difficulty of standardizing efficiency in all the operations of a large factory was enormous; and the character of the premium offered under the scheme was discovered to be seriously defective. Mr. Towne thought at first that the device would prove more workable than profit-sharing; but he found he was mistaken.

The second scheme is known as Halsey's "Premium Plan." It consists in offering to the workman a premium on the time saved in doing a given job; it being a cardinal point with the author that the hourly premium is less than the hourly wages. The scheme is fully expounded in the report; and the results in four cases where it has been applied are stated to be satisfactory. At the same time, it is noted that the plan is of limited applicability. It seems to suit single-handed jobs of repetition work, such as turning out specialities by combined hand and machine labour; but "the limited range of Mr. Halsey's experiment, covering as it does only that part of the field in which the success of any such system as this 'premium plan' is most facile of attainment, makes it impossible to accept the results of his experience as conclusively demonstrating the general utility and applicability of his plan." Two other bonus schemes that come next in Mr. Schloss's list do not appear worth discussing.

Willans and Robinson's "Reference-Rate" system is a most interesting experiment, fully explained in the report. The scheme is decidedly complicated; and while the firm declare the results to be satisfactory on the whole, it shares the quality of Mr. Halsey's plan, in answering better for single-handed jobs than for work done by groups of men. Thus it is recorded that the men working in the firm's foundry have so far failed to earn any bonus, which in their case would be based upon the aggregate output. According to the Works Manager, this "Socialistic" arrangement, as he calls it, is ill calculated to promote that special efficiency which it is the object of the bonus scheme to evoke. It is admitted besides that the plan necessitates a good deal of book-keeping; and that the special class of work done by the firm facilitates their peculiar system of remunerating labour.

The "Good Fellowship" system of the Thames Iron-Works and Shipbuilding Company, Limited, was introduced by the Managing-Director, Mr. A. F. Hills, after a proposed profit-sharing scheme had been rejected by the workmen acting under the influence of the Trade Unions. The leading features of the scheme are payment by results, as contrasted with time-wage payment, and the collective nature of the system of remuneration. When the firm tender for a contract, the amounts reckoned as labour-costs are arrived at after consultation with the foremen of departments. If the contract is secured, the estimates are gone through in detail, and the job is divided into "takes," which are given to "Fellowship" groups to carry out. How the scheme is ultimately managed, can be seen by Mr. Schloss's painstaking investigation of its ramifications. The report is in this respect a monument of labour directed to the record and explanation of a most remarkable industrial experiment. The trouble that Mr. Hills must have taken in carrying his scheme out in almost every one of the multifarious departments of the Thames Iron-Works, argues strongly for the gravity of the antecedent labour troubles which it was designed to remedy. It is significant that this scheme shows to least advantage where the Willans and Robinson plan also breaks down—in the iron and brass moulding departments. Mr. Schloss, while regarding the scheme benevolently, does not think its advantages proved for either employers or employed.

* Report on "Gain-Sharing and Certain Other Systems of Bonus on Production," by Mr. D. F. Schloss. (Board of Trade—Labour Department). London: Eyre and Spottiswoode; 1895.

On the whole, and after an impartial survey of all there is to note on behalf of these exhibitions of the gain-sharing principle we cannot say we like it, or see in the applications anything more than a well-meaning but mistaken attempt to secure the benefits of piece-work without the inevitable drawbacks. The principle, in its essence, is simply a means of inducing workmen to exert themselves more—to put forth a more strenuous effort, to produce more than the average or standard deducible by common observation and experience for the kind of labour, the time, and the men. There are no doubt many kinds of work, and of workmen, to whom this forcing process may be fruitfully applied; but is it the right thing to do, particularly as it cannot be done for all? It is admitted both by Willans and Robinson and by the Thames Iron-Works, that work in the foundry does not lend itself to the forcing system; and it is easy to understand the reason for this failure without dragging in fancy considerations concerning the effect of the "Socialistic" cast of foundry work. The rivetter may be speeded up by the prospect of earning a bonus; the moulder must take his time. Is then the moulder less worthy of encouragement than the striker? The opposition of certain Trade Unions to piece-work may proceed from mixed motives; but, so far as it is based upon an objection to "driving" the workman, it is wise and justifiable. What is wanted in the world is faithful, honest, reliable work; not specially fast, or even most profitable, production. It is for this reason mainly that we prefer the idea of profit-sharing to that of gain-sharing. That can be no satisfactory reformation of the conditions of labour which only takes account of the obvious producer—be he smith, or hoister, or rivetter. "They also serve who only stand and wait;" and the elevation of the wage earner will not be complete while a single door-keeper is overlooked in the operation. This consideration also supplies the best answer to those who (like Mr. Towne and Mr. Halsey) object that in profit-sharing workmen get a share in what they do not earn. It is, however, by virtue of the combined services of every individual in a particular employment that the eventual result is brought about; and it would be an error to divide these services into effective and non-effective branches. Nor, from what we can gather, does Mr. Schloss think differently from us in this matter.

AN UNFIT SURVIVAL.

It is recorded of the late Fleeming Jenkin that, when he took up his professorship of Engineering at Edinburgh, he ordered the removal from the library shelves of the University of all text-books and technical manuals more than ten years old. The rule here indicated is a sweeping one; and, of course, it has its notable exceptions. But it is a pretty safe guide to what is worth study in purely technical literature; and it needs a master to distinguish the exceptional books which are worthy of being kept for reference or reproduced from time to time by means of new editions. Unhappily, publishers of technical books are very unsafe guides in a matter of this kind. The interests of their trade are not always identical with those of the trades which form the subject of their books; and this is especially the case in regard to the reissue of old manuals, whether cold or *rechauffé*. This little book upon gas-fitting* is an example of the reproduction of a work that no skilled technician would have thought worthy of being reissued, at any rate without its being rewritten from end to end, and not merely "freshened up" in a totally inadequate fashion by the addition of an extra chapter or two purporting to describe the latest improvements in gas-burners. The book is not of sufficient importance to call for detailed criticism here; indeed, another volume of equal size would be required to expose the errors, and make good the deficiencies, of the original. Suffice it to say, that we cannot recommend the book as a safe or "up-to-date" authority upon the subject of which it professes to treat; and we are quite sure that it will not be put upon the City and Guilds of London Institute list of manuals suitable for the technical instruction of the student of either gas manufacture or plumbing. When we state that the first portion of the book gives an elaborate direction for making holes for service-pipes in gas-mains by the aid of the round-nosed chisel; and that, in the "supplementary chapter," the only regenerative burner illustrated is the oldest Siemens pattern, while the "Douglass" burners are described as having been "only recently placed upon the market," enough has been said to exhibit the quality of the whole publication. Why does not some competent gas company's inspector give the world an acceptable guide to gas-fitting?

Mr. Sydney J. H. Willey, youngest son of the late Mr. Alderman Willey, founder of the firm of Willey and Co., of Exeter, was married on Tuesday last to Miss Florence Alice Husson, younger daughter of the late Mr. J. F. Husson, of Kilmore, Pennsylvania. The employees of the firm with which Mr. Sydney Willey is associated, presented him with a barometer, thermometer, and clock combined, mounted in a handsome carved oak case, bearing a suitable inscription.

* "Gas Fitting: A Practical Handbook treating of Every Description of Gas Laying and Fitting." By John Black. Second Edition. Enlarged. Weale's Series. London: Crosby Lockwood and Son; 1895.

TECHNICAL RECORD.

SOUTH-WEST OF ENGLAND DISTRICT ASSOCIATION OF GAS MANAGERS.

Half-Yearly Meeting at Barry.

The Half-Yearly Meeting of the above-named Association was held at the Gas-Works, Barry, near Cardiff, on Tuesday last. Mr. F. G. Dexter, of Winchester, the President, occupied the chair.

A Welcome to the Association.

The President, in opening the proceedings, said that many arrangements had been kindly made for their reception and entertainment at Barry. He had to introduce to their notice Mr. Meggitt, the Chairman of the Water and Gas Committee of the Barry Urban District Council, and Mr. Jones-Lloyd, a member of the Committee.

Mr. J. C. Meggitt, addressing the members, said he wished to offer them a very warm greeting upon their meeting at Barry. He expressed the feelings of the whole of his colleagues on the Urban Board, when he hoped that they would have very pleasant experiences during their visit. Barry was of very recent growth. Eleven years ago, within a radius of three miles of the building where the meeting was being held, there were not 500 inhabitants where now there were 20,000. Such enormous progress was due to the commercial enterprise of those who had created the Barry Docks. It involved provision for the wants of the people, of which gas and water were most important items. The property of the Barry Gas-Works had until recently been owned by a Company; and it proved very profitable. The people of the district, however, had decided that, if profitable for a Company, the provision of these necessities might become even more profitable and serviceable if the town took it in hand. The Urban District Council therefore had acquired the Barry gas and water undertaking; and a magnificent property it was.

Mr. Jones-Lloyd endorsed the hearty welcome Mr. Meggitt had tendered to the Association. He remarked that, although Barry was new in some respects, it was old in others; for over on the Island they would find remains of a church which took them back 1100 years.

The President moved a vote of thanks to the representatives of the District Council, who had so kindly welcomed the Association; and he referred to the very complete arrangements made by Mr. F. M. Harris, the Engineer and Manager, for their entertainment. Their gratitude was, however, partly due to the members of the Urban Council for permitting him to undertake the work.

The vote was carried with acclamation; and Mr. Meggitt briefly responded.

Formal Business.

In the absence of the Hon. Secretary, Mr. W. Sainsbury, of Salisbury, read the notice convening the meeting; and the minutes of the meeting held at Winchester in April last were taken as read.

Scrutineers were then appointed to examine the ballot-papers for the election of officers for the ensuing year.

Mr. Sainsbury next read the items of the balance-sheet, from which it appeared that on the income side the balance from last year was £34 15s. 2d.; the receipts, £19 19s.; making a total of £54 14s. 2d. The expenditure for the year was £23 13s. 8d.; leaving a balance in hand of £31 0s. 6d.

The President moved that the statement of accounts be adopted.

Mr. H. F. Vincent (Frome) seconded the motion, and it was agreed to.

The Late Mr. Hardick.

The President said that, at their last meeting at Winchester, it had been their painful duty to chronicle the deaths of two active members of the Association; and at the present meeting again they had to mourn the loss of another one—Mr. Thomas Hardick, of Salisbury.

Mr. H. Sainsbury (Trowbridge) moved the following resolution: "That this meeting desires to express a feeling of sincere regret at the decease of the late Mr. Thomas Hardick, to record the high esteem and respect entertained for him as a Past President and member of the Association, and to convey a vote of sympathy and condolence to his sorrowing relatives." He remarked that the deceased gentleman was one of the fathers of the Association. He had reached the advanced age of 90 years; but until about three months before his death, he was at his post superintending the gas-works at Salisbury. They would all remember the kindly way in which Mr. Hardick treated them, and the value which always attached to his advice and assistance. He was present at nearly every meeting; and when anything was to be done which required special tact and judgment, it was always put in his hand. The memory of Thomas Hardick would always be green and fragrant in their recollection.

Mr. S. W. Durkin (Southampton) seconded the motion, and the meeting voted it by rising in silence.

ELECTION OF OFFICERS.

The PRESIDENT announced that the following was the result of the ballot:—

President.—T. W. R. White, of Sherborne.
Vice-President.—R. Beynon, of Torquay.
Hon. Secretary.—N. H. Humphrys, of Salisbury.
Auditor.—W. Higgs, of Basingstoke.
Members of Committee.—C. V. Bennett, of Wells; W. Davis, of Poole; and A. V. Daniel, of Portishead.

NEW MEMBER.

Mr. J. W. Turner, of Torrington, was elected a member of the Association.

PROPOSED AMALGAMATION WITH THE SOUTHERN DISTRICT ASSOCIATION.

Mr. D. IRVING (Bristol) moved, in the absence of Mr. Lowe, of Weymouth, the following resolution: "That this Association approves of the proposal for amalgamation with the Southern Association; and that the President, Mr. Irving, and the Hon. Secretary be appointed to meet a Committee of the Southern Association, to confer on the matter, and, if desirable, arrange terms." In a delicate matter of this kind, said Mr. Irving, it would be desirable he should not discuss details, and he would leave the matter with the meeting, only remarking that the passing of the resolution would not bind them to any final decision.

Mr. H. SAINSBURY, as one of the old members of the Association, seconded the motion. He agreed that the interests of the Association would be best served by not discussing the matter that day. Sometimes there was a good deal of overlapping between Associations, and he believed that amalgamation would help both Associations.

The resolution was carried unanimously.

NEXT PLACE OF MEETING.

The PRESIDENT said they could not yet fix the next place of meeting because the newly-elected President was not present. He suggested the matter should be left to the Committee.

MR. DURKIN'S PAPER.

Mr. DURKIN then read a paper entitled—

THE WANT OF MUTUALITY BETWEEN VARIOUS AUTHORITIES USING THE SUB-SOIL OF PUBLIC ROADS.

It has often occurred to me when giving notice to local authorities in our district, before breaking ground for the purposes of my Company, that the law was very one-sided in this matter, compelling us to give specific notice of our intention to the surveyor of the borough or district council, as the case may be. In our district, the names of these is legion; our mains running into so many parishes or places outside the county borough. These various authorities grant permission to all sorts of persons to open the ground for different purposes, without affording gas undertakings the opportunity of taking precautionary measures, to prevent mishap to their pipes.

I confine my remarks to gas-pipes, as they require safeguarding to a larger extent than water-mains; because, owing to the nature of their contents, one can hardly specify the amount of damage that may accrue from accidental breakages.

In our time, I daresay we have had many hair-breadth escapes, arising from damaged mains and service-pipes, from causes beyond individual control—such as those terrors by day, the steam-roller, sewerage works, &c. One instance is fresh to my mind. An escape of gas was reported in a certain busy street, in which there was a main on either side. As the gas found vent at a gully, the main nearest to it was stripped, but revealed nothing. Still the gas was in evidence; and precautionary measures were taken to prevent an accident. From some local knowledge of the drainage system, I recollected that the surface drains were distinct from the sanitary system. But, being late in the evening, no information was obtainable as to the position of these surface drains until the next morning; and then, owing to changes in the staff of the sanitary authority, the information given was not very satisfactory.

However, the Inspector of Works pointed out that a branch sewer had been laid on the opposite side of the street, close to another gully. Instructions were at once given to open the ground over the main across this branch sewer cutting. In doing this, the overflow from gully No. 2 was found sunk and broken from the subsidence of the sub-soil; the rainfall doing what the jerry sewerman (who I believe was a joiner by trade) had left undone. The sub-soil sinking broke the drain; and our gas-main followed suit—the escaping gas finding its way into the fractured drain-pipe, following its course down and across the street, and up to gully No. 1., which was unsealed. Fortunately, no accident occurred, and matters were soon put right. A claim was sent in to the jerry sewerman, which claim he ignored, stating, as a reason, that he had paid a deposit of 10s. at the Borough Surveyor's office, and that the deposit had been returned to him on the presumption that he had done his work in a satisfactory manner. This is only one of many instances in my town, as well as others, going on year in and year out, and of which, I contend, we should have had intimation. As some safeguard, our lamp-lighters are instructed to report on these matters to the street inspector; but I cannot say they do so at all times.

In these days of so-called advancement, we have to face fresh difficulties. Take, for instance, tramways. A very stringent clause has been inserted (33 and 34 Vict., cap. 78, clause 30) for the protection of those who use the sub-soil for various purposes. Yet, on several occasions, I have had to assert our legal position with the local Tramway Company, whose Engineer first disputed the position taken up, but afterwards acknowledged the mutuality of our relative positions. Then we have the Electric Light Company to deal with. In this case, we have recognized our mutual responsibilities, and serve notices on each other. But, in the first instance, I had to be very firm; and I prevented them from covering over a main with their culvert, as, under the powers of the General Act, the Board of Trade had inserted in the Licence provisions to ensure access to gas-mains, &c. Then again Railway Officials will sometimes ignore the mutuality of our respective obligations, and need watching. I have also known that officials in different departments of the Sanitary Authority do not recognize the controlling department of the public roads.

I feel that, for want of time, I have not done this subject full justice; but, in bringing my remarks to a close, allow me to call your attention to the judgment recently delivered in London in the case of *Price v. The South Metropolitan Gas Company*. His Honour considered negligence had been established—first, in that the defendants had not discovered the fracture by the smell of the escaped gas, and also in not seeing that their pipes were left properly supported after other persons had, to their knowledge, been excavating and working around them.* There, gentlemen, by that judgment, you are supposed to know what is going on in your several districts; and it is your responsibility to deal with these matters, whether you know of them or not. Whether the defendant Company did know of the disturbance or not, leave was given to appeal against this judgment; and I trust it may be reversed.

In conclusion, it appears to me that a short Act of Mutuality might be passed, to enforce notice to be given by all parties who have powers of disturbing the soil for legalized undertakings. What your views may be, I know not, but now you have an opportunity of expressing them.

The PRESIDENT, after the reading of the paper, said the question dealt with was a very important one, particularly for gas companies as distinct from gas and water companies. He had himself recently had a case in which the overhauling of drains had resulted—through the under side of the gas-pipes not being properly protected when the subsoil was replaced—in the breakage of gas-pipes, the escape of the gas, its lodgment in a a man-hole, and subsequent explosion—tearing up the roads. He suggested that, in view of the importance of the question and the small attendance at the present meeting, the discussion should be postponed to the next meeting.

This was agreed to.

Mr. J. H. CORNISH (Bridgwater) proposed, and Mr. J. J. JERVIS (Swindon) seconded, a vote of thanks to Mr. Durkin.

The motion was carried; and

Mr. DURKIN, in acknowledging the vote, remarked that his paper was merely introductory to a very large subject.

VOTES OF THANKS.

On the motion of Mr. IRVING, seconded by Mr. J. H. GREY (Weston-super-Mare), a vote of thanks was passed to the retiring President, for the tact, energy, and organizing ability he had displayed during his occupancy of the chair.

The PRESIDENT expressed his gratitude for the vote, and moved a similar resolution in regard to Mr. Harris, for the large amount of trouble he had undertaken in connection with the meeting of the Association.

Mr. DURKIN seconded the motion; and the vote was accorded with applause.

Mr. HARRIS briefly responded; and the formal proceedings terminated.

Subsequently the members inspected the Barry Gas-Works and the Barry Docks; and they afterwards drove over to Barry Island. Later in the evening, they dined at the Barry Hotel.

Mr. F. M. HARRIS thoughtfully prepared a few notes referring to the gas and water works, the docks, and the new graving dock, so as to give the members some idea of the rapid extension of the district during recent years. He said: Before the commencement of the construction of the Barry docks and railways, the population of the district was a very small one; certainly not exceeding 1000 people in all, and probably much under this number. At the beginning of the extensive works connected with the docks, a large number of workmen flocked to the district; and the contractors for the docks had to erect houses for them. But the centre of the district, now the most populous, was not built upon until after the opening of the railway in 1889, as the carriage of building materials was too costly before this date. The capital of the Gas and Water Company authorized by their Act of 1886 was only a small one. But it was imperative to commence operations; and as indications became apparent that the place was likely to grow rapidly, the main object for consideration was to obtain as much land as the Act permitted, and, in the case of the gas-works, to erect a few buildings as large as possible, but arranged to allow of easy

* See JOURNAL, Vol. LXV., p. 1385.

extension. This course was followed with the other plant; and the mains were laid as large as possible. The principal building, the retort-house, measures 100 feet by 73 feet, and now serves the double purpose of retort-house and coal-store combined. But ample space has been reserved on the ground for the erection of a new coal-store; also for the extension of the retort-house and other buildings, and for additional gasholders. The population of the district has increased from about 5000 to over 20,000 in five years; and the gas consumption has about doubled during the past three years. It is expected that it will soon attain to 50 millions and more. The water supply is from a well sunk at Biglis, about three miles from the gas-works. The water is pumped by vertical high-pressure triple-expansion direct-acting "Worthington" condensing engines into the high-level and low-level reservoirs. The height of the water in the reservoirs is communicated by electrical indicators to the pumping-station, and to the Engineer's office at the gas-works; and the pumping can be regulated accordingly. The Barry dock is the largest single dock in the world; and it contains the most modern plant of any existing dock. The dock gates are opened by direct-acting hydraulic rams, 26 feet stroke and 30 inches diameter. The whole of the tips, capstans, and other appliances are actuated by hydraulic power. The shipments of coal from the dock have now attained to about 5 million tons annually. The deep-water lock entrance, when completed, will give Barry an advantage over any docks in the Bristol Channel; and besides this, an extensive import dock is in course of construction, as well as a new railway called the Vale of Glamorgan Railway, which will open up an entirely new district. The Barry Graving Dock is an undertaking independent of the Barry Dock Company; but it is connected to the main dock, and like the Barry dock contains the most modern and approved appliances. It will dock a vessel, if required, up to 700 feet in length. The centrifugal pumps are capable of delivering 40,000 gallons of water per minute. Barry can thus claim to be probably the most progressive town—if not in England, certainly in the South-Western district of the United Kingdom.

Lectures on "Gas Manufacture."—The Committee of the Goldsmiths' Institute, New Cross, have arranged to give a course of lectures on "Gas Manufacture;" and the session will be opened on Friday evening, Oct. 4, with an introductory address by Mr. A. Vernon Harcourt, F.R.S.

The Autumn Meeting of the Incorporated Institution of Gas Engineers.—The programme for this meeting has now been issued; and it promises full employment for the members on Thursday and Friday of next week. An early start on the former day—9.50 a.m. from Lime Street Station—is to be made for the Garston Gas-Works of the Liverpool United Gaslight Company, to see the carburetted water gas plant and other special features of the place. Brakes will then take the members through Sefton Park to the Herculaneum Dock; and an inspection will afterwards be made of the plant working the Electric Overhead Railway between Nelson Dock and Pier Head Stations. The tender of the Cunard Company will at 3 o'clock convey the party to look over the R.M. steamer *Lucania*, accompanied by the General Manager of the Company, Mr. Thomas Boumphrey. At 7 o'clock, the members are invited to dine with the Chairman and Directors of the Liverpool Gas Company. On Friday, a visit will be paid to Chester—travelling *viâ* the Woodside ferry-boat to Birkenhead. After an hour and a half spent in the ancient city, and luncheon at the Grosvenor Hotel, there will be a trip by steamer on the River Dee as far as Eaton Hall, the seat of the Duke of Westminster. All the six stations of the Gas Company will be open to members during the two days; so that everything has been done to make the visit both instructive and interesting.

Institution of Civil Engineers.—In accordance with their custom, the Council of the Institution have issued a circular inviting original communications on subjects of professional interest for the session 1895-6. A number of suggestions for papers—66 in all—are supplied; but the list is not, it is pointed out, in any sense exhaustive. Many of the subjects mentioned are more or less interesting to our particular class of readers. Among them are: "The Methods of Enriching Coal Gas, and their Effect on its Calorific and Illuminating Values;" "The Production and Enrichment of Water Gas;" "The Recent Developments in Gas-Engines and Oil-Engines, including a Comparison of the Relative Merits of the Several Cycles, with Reference to 'After-Burning';" "The Application of Oil and Gas Engines to Tractive Purposes on Common Roads and on Tramways, and to the Propulsion of Vessels;" "The Methods of Conveying and of Using Natural Gas;" "The Modern Methods of Pumping, Compared as to Cost and Efficiency;" "The Use of Steel in the Construction of Large Water-Tanks;" and "The Purification of Large Quantities of Water after its Use in Manufactories." Several subjects dealing with electrical matters are suggested, in one of which gas and water engineers are specially concerned—viz., "The Electrolytic Action of Return Currents in Electrical Tramways on Gas and Water Mains, and the Best Means of Providing against Electrical Disturbances." For approved papers, the Council may award premiums, arising out of special funds bequeathed for the purpose, particulars of which are given in the circular.

EASTERN COUNTIES GAS MANAGERS' ASSOCIATION.

Meeting at Wisbech.

The Fourteenth General Meeting of this Association was held last Thursday, at Wisbech, under the presidency of Mr. C. W. GRIMWOOD, of Sudbury. Thanks to the assistance of the Manager of the local Gas Company (Mr. R. J. Sharman), admirable arrangements for the day were made by the Committee. The members first assembled at the gas-works, where light luncheon was provided by the kindness of the Directors of the Company. The works were inspected by the visitors, who appeared to be much struck by the neatness which everywhere met the eye, and especially by the flourishing condition of Mr. Sharman's orchard and garden adjoining the works, which would disabuse the most sceptical mind of the belief that vegetation will not thrive in proximity to gas-works.

The meeting was subsequently held in the Town Hall; and before the business on the *agenda* was proceeded with,

The PRESIDENT introduced to the members the Mayor of Wisbech (Mr. A. W. May).

The MAYOR said it gave him great pleasure in being present at the meeting. He esteemed it no small honour to have the privilege of welcoming the Association to the borough; and this, in the name of the burgesses, he did most heartily.

CONFIRMATION OF MINUTES.

The HON. SECRETARY and TREASURER (Mr. H. Wimhurst) read the minutes of the meeting held at Sudbury in May last; and they were confirmed.

NEW MEMBERS.

The following gentlemen were elected members of the Association: Mr. H. Keirman, of Thorney; Mr. R. G. Shadbolt, of Grantham; and Mr. H. Green, of Market Rasen.

THANKS TO THE MAYOR.

The PRESIDENT said their next duty was to pass a vote of thanks to the Mayor for so kindly gracing the meeting with his presence, and for lending the Association the Chamber in which they were meeting. On behalf of the members, he might say they sincerely felt the honour his Worship had done them in welcoming them; and he begged to thank him most heartily for doing so.

Mr. J. CARTER (Lincoln), in seconding the motion, said it was not at all an unusual experience for the Association, as they visited the various towns within their district, to receive a hearty welcome from the gentlemen who had been elected to fill the highest positions of civic honour in these towns. The members had highly appreciated what those gentlemen had done on previous occasions; and they equally highly appreciated what the Mayor had done that day.

The MAYOR, in acknowledging the kind way in which the members had accorded him the vote of thanks, said he anticipated having an opportunity later in the day of again referring to the honour done him in inviting him to be present at the meeting.

LETTERS OF APOLOGY.

The HON. SECRETARY reported having received letters of apology for absence from Mr. W. R. Chester, the President of the Incorporated Gas Institute, and from some of the members who were unavoidably prevented from attending.

REGENERATIVE SYSTEMS OF FIRING FOR SMALL WORKS.

The PRESIDENT said the Secretary had taken an immense amount of trouble in sending letters to the members, in order to obtain a suitable paper for this meeting; but owing to circumstances over which he certainly had no control, he had been unsuccessful. This being the case, at the last meeting of the Committee, it was suggested that, failing a paper, they must inaugurate discussions on matters that might be of use to the members. The Committee therefore decided to introduce three subjects for discussion—viz., (1) The incandescent system of supplying the public lamps; (2) regenerative systems of firing; (3) the manufacture of sulphate of ammonia in small works. They had hoped that Mr. Joliffe would have been present, as he had recently introduced the incandescent system for public lighting in a large way at Ipswich. They were still hoping that he might, later on, arrive in Wisbech; so that they would pass over the first subject for the present, and take the next one—on the regenerative system of firing.

Mr. A. DRAGE (East Dereham) said that, at the last meeting at Sudbury, he read a paper on gas-works construction, in the course of which he mentioned regenerative furnaces. He then remarked that he found, in a bench of sixes which he now had, with nozzle holes in the top of the arch, that the top retorts got cut away; and, on this point, there was a little discussion. Some of the members said that the centre retort was protected, and could not be destroyed; but he said he did not know what would happen to a centre retort in a bench of seven. His experience was that the top or centre retort usually suffered most from the cutting action of the heat. At the Ipswich meeting, Mr. Best read a paper in which he gave some information as to air passing in through a patent brick that he had; but there was not sufficient reason given as to why he required this supply of air. By cutting a way through the nozzle holes,

he (Mr. Drage) had done away with the arch altogether. He could not see why these arches should be put in, when it was said that, what they required to have, was a large combustion chamber. Mr. Child told them at the Yarmouth meeting that he had adopted the late Mr. Somerville's patent setting. He (Mr. Drage) had these settings; but Mr. Somerville's son had a patent setting, in which were two arches. Why he had these two arches when the combustion chamber should be as large as possible, he could not conceive. He found that he obtained the best results by taking the arches completely out, and allowing the heat to play freely through the furnace.

Mr. C. GREEN (Market Rasen) said his experience had been with generator furnaces on Drake's principle. They formerly worked three beds of fives on the ordinary system. At this time of the year, however, they used a bed of threes without generator furnaces, and during the heavy part of the winter a bed of sevens. They made 9900 feet of gas per ton of coal during the past year, without an exhauster. If they tried to push the make, it would run to about 7000 feet per retort per day. Their place being a small one, they did not always want the retorts all charged. He found, in the bed of sevens, that the middle retort was as good as ever. The past year had been an excellent one for his Company. They had been used to a dividend of 1½ per cent.; but this year they had paid 5 per cent., and, in addition, £160 to Messrs. Drake and Son. He might mention that the retorts were 22 inch by 15 inch and 9 feet long.

Mr. W. J. BEST (St. Ives) said that, seeing Mr. Drage had attacked his secondary air supply, he might say that the object of introducing this secondary air was to get complete combustion in the retort-setting. At many works he had seen the flames from the furnaces playing about the tops of the chimneys, which showed that combustion was taking place there rather than in the furnace itself. But, with the secondary air supply, he found there was better combustion, the charges were burnt off much quicker, and there was a less consumption of coke than with the ordinary furnace.

Mr. A. MITCHELL (Bury St. Edmunds) said he had had no experience with regenerative furnaces beyond that which one might have by general knowledge of what these furnaces had done and were doing. They must all agree that the use of the regenerative furnace for the carbonization of coal had passed the experimental stage; and that it was an improvement on the ordinary method of firing had passed the stage of discussion. The regenerative system of firing appealed to each individual, whether it was worth while adopting it in his own works. The whole question seemed to him to lay in this: There was a considerable additional capital outlay in putting down the regenerative system over that of the old-fashioned direct system of firing; and in many gas-works in the Eastern Counties it was just possible it would not be economical to pull down the stacks of retorts—more especially in towns where they were non-progressive—and construct a new system. In these cases, it was a question of pounds, shillings, and pence; and, in all likelihood, it would not pay to pull down and rebuild for all the benefit that might be derived. No two gas-works were alike as far as their conditions were concerned. In many works in the Eastern Counties, they had ample gas-making power; and under the direct system of firing, they found they had sufficient retorts for years to come without altering the system. On the other hand, by introducing regenerative firing, they would economize largely in the matter of fuel. This was just the point, whether it would be, under these circumstances, worth while incurring this outlay for all that the increased saving of fuel would bring in. He knew that, from the ordinary scientific way of looking at things, this was not the proper light in which to regard the matter; but in works of the description in their district they must consider the question of pounds, shillings, and pence. If they produced, by means of regenerative furnaces, more coke for sale than they could get rid of, they would have to reduce the price; and he did not see, in that case, where the gain would come in. Then Mr. Green had pointed out that with his regenerative furnaces, he was not able to have continuous working. Now he (Mr. Mitchell) maintained that, if he could not have continuous working because of the regenerative settings, it would have been far better to have kept to continuous working with the old settings, because he might in this way be consuming as much fuel as on the old lines for the amount of gas produced. Then it was no use for a manager to go in for a higher result per mouthpiece if he had not ample gasholder accommodation, because in a bed of (say) six retorts making 45,000 cubic feet per 24 hours, this 45,000 cubic feet would perhaps represent an extraordinary addition to the previous make and consumption of gas; so that, unless the manager had ample storage, he would simply have to fill his holder up, and then lay off. It was therefore a matter for each one to take up, and find out whether there would be any benefit in introducing a new system which would give him 45,000 cubic feet per day, or stick to the old system by which he obtained (say) 24,000 feet, which his consumption and gasholder capacity could cope with. However, he freely admitted that the regenerative system was not only an economical one, but scientifically a vast improvement on the old method,

Mr. J. G. HAWKINS (Spalding) believed that regenerative firing was the proper system, supposing the works were of sufficient size to warrant its adoption, because (as Mr. Mitchell had pointed out) it was of no use making gas if they had not the place to store it. It resolved itself into this—Did they make more gas per ton of coal when firing on this principle than on the ordinary system? It was just possible they did, because if the retorts were kept at a uniform heat, and were worked regularly, he thought they must get a larger yield; and this was what they must look at when considering the kind of firing they should adopt.

Mr. J. BARTON (Peterborough) said that, though he had not had any experience of regenerative gas-firing, he believed that the system was the correct one, whether the works were small or large. There could be no question that the saving in fuel was very considerable with regenerative firing; and, moreover, they had greater control over the heating of the retorts. He believed they obtained better and more constant heats; and so there could be no question that the results per ton of coal were better, and the illuminating power of the gas more uniform. It had often puzzled him why there should be such variations in the quality of the gas with the old system of firing. Using precisely the same coal from one day to another, there would be a great variation in the illuminating power—all the conditions being the same, except the heats. He had often noticed that, when the heats of his retorts were lower than they ought to be, the quality of the gas was not so good as he should have liked. He was quite convinced that any neglect that might arise on the part of the stokers in letting down the fires and their heats (as many of them did) was frequently the cause of the quality of the gas suffering. They could only get uniform heats by using regenerative furnaces; and there was a considerable saving of fuel. He firmly believed that it would pay every gas manager, no matter what was the size of his works, to adopt the regenerative system. He was himself putting in four furnaces this year.

Mr. WIMHURST said that he had lately gone in for regenerative firing, for Sleaford, on a very extensive scale. He had adopted Winstanley's system; and they had put down a plant capable of making from 160,000 to 200,000 cubic feet per day. Whether he would reach the maximum figure, he could not say; but he was hoping, during next winter, to get through with a make of 7000 to 8000 cubic feet per mouthpiece per 24 hours. If the figures given by Mr. Winstanley could be relied upon, they could readily make, at a push, 9000 feet, with 21 in. by 15 in. ovals, 10 feet long. In all probability, the members would have an opportunity, in the course of next month, of visiting Sleaford, to see what was being done in this respect, and also other extensions. By that time, they would have the whole of the new plant at work, and possibly by then he would be able to give a few figures as to the results obtained. He was sorry he had not been able to get the works finished, so that they might have adjourned from this meeting to visit them. But the contractors were delayed very much indeed through the severe weather in the spring; and, consequently, they were about two months behind the proper time. He hoped, on some future occasion, to give the Association a paper on this installation of regenerative settings. He believed the regenerative system was the one to adopt not only in large but in small works. Mr. Mitchell had spoken about the plant standing off when there was no holder room. He (Mr. Wimhurst) thought this was one of the chief features—that they could damp down or check the regenerative furnaces much more than in the ordinary system. The air supply could be fully shut off, and the heat maintained for 24 or 48 hours, without any apparent injury. This was one of the beauties of the system; and he only hoped that what they had done at Sleaford would meet with its reward.

Mr. J. MASON (Oakham) mentioned that he had just had two beds of retorts constructed on the regenerative system.

Mr. GREEN asked to be allowed to add that, during the past winter, through having the regenerative setting at work, he had been able to do without a night man altogether, which saved 11s. a week for six months.

Mr. T. GREAVES (Melton Mowbray): You say you obtain 9900 cubic feet of gas per ton, without an exhauster. What coal do you use?

Mr. GREEN: Strafford and Barrow nuts. Replying to Mr. Troughton, he said he could not give any figures regarding the fuel account, because they were often firing when they did not want to use the retorts; but the air-flues were then closed, so that little fuel was used. He knew that they were saving a great amount.

Mr. WIMHURST: The patentee of the system put down at Sleaford guarantees that the percentage of fuel shall not exceed 10 lbs. per 100 lbs. of coal carbonized.

Mr. BARTON said one point struck him with reference to Mr. Drage's remarks. He mentioned that he had a cutting action on the top retorts; and he would suggest that this might result from the nostrils being too small. He had perhaps too much primary or secondary air, which caused a cutting draught through the nostrils, which, of course, must cut away the retorts next to the nostrils. He (Mr. Barton) put down a generator furnace last year; and he had had this experience. He found the nostrils were too small; and, since he had enlarged them, he had had no trouble. The nostrils were previously 4 inches square; now they were about 6 inches.

Mr. DRAGE stated that he had found a cutting action through the nostrils, which were 4½ inches square; but since he had removed the arch, the cutting had ceased.

The PRESIDENT, in closing the discussion, remarked that he was, a few months ago, at the Croydon Gas-Works, and there he saw Mr. Winstanley's system in operation. They were very pleased with the results there. When they found works of this magnitude adopting the system, they could not but come to the conclusion that it must be a good one. There was a little works in the vicinity of the town in which he lived where the system had been adopted during the past summer; and he hoped to benefit by their experience.

THE MANUFACTURE OF SULPHATE OF AMMONIA ON SMALL WORKS.

Mr. SHARMAN opened the discussion on the above subject. He said his Directors went thoroughly into the question of manufacturing sulphate of ammonia some thirteen years ago. They came to the conclusion that it would be for the benefit of the Company to undertake it; and he believed the facts he was able to lay before the members would bear that out. After visiting several works, the Directors adopted the simple plant which was now in operation. Of course, being a small works, they could not carry on sulphate manufacture continuously. They worked in the winter time three days a week, or every other day; and with the liquor at a fair strength—4° Twaddel, or 8-oz. liquor—they could average a production of 15 cwt. of sulphate per day. It took about 2000 gallons of liquor to produce this quantity. They used, per ton of sulphate, 18 cwt. of acid; and the cost of the fuel and lime he put together at 8s.—the coke at 7s. 4d., and the lime at 7d. This made the cost so far £3 11s.; but the total cost of manufacturing a ton of sulphate including labour for unloading acid, revivifying oxide, and emptying purifiers, was £4 8s.—including acid and everything. In 1894, they made 32 tons of sulphate from 3200 tons of coal, which was equal to a ton of sulphate per 100 tons of coal. This, with the system he had at work, was, he believed, up to the average. They netted for the 32 tons rather more than £250. He had made an estimate of the value of the liquor. He took the weekly prices quoted in the JOURNAL OF GAS LIGHTING, and worked out the average, which was 11s. per ton for 10-oz. liquor. His liquor being only 8-oz. he deducted a fifth, and then allowed a little more margin, having taken the highest prices. It was frequently quoted at a difference of about 2s. 6d. per ton; and valuing his liquor at 8s. per ton, it came to £135 12s. Then, after making a deduction for fuel—about £12 or £13—he had left rather more than £100 clear profit over what he would have realized had he been selling his liquor. This, he thought, was a very good result for a small works like theirs; indeed, it seemed to him to be a handsome profit—representing 1d. reduction in the price of gas. There was one thing a manager had to take into account when he was considering the adoption of sulphate plant; and it was that, in some places, there would be great difficulty in getting rid of the refuse. At Wisbech, he was in such a position that he had not to contend with this difficulty. They got rid of the condensation from the gas in a well, as they could not discharge it into the public drains, being prohibited by the Local Government Board inspector. The waste liquor, after it was boiled and cooled down, was not detrimental to them at all. In places where there was no system of drainage, there would be a difficulty. To run it into a stream would be undesirable; but in a tidal stream, perhaps it would not matter. He most decidedly advised all managers of works making over 20,000 cubic feet of gas a day, to go in for the manufacture of sulphate. Anyone beginning now would no doubt put down plant which would excel his; and perhaps the same acid would not be used. He employed B.O.V. acid; and they made white sulphate. Of course, they could buy acid cheaper; but he would not get that quality of sulphate which he liked to send on to the market.

Mr. BARTON said they manufactured sulphate at Peterborough, and had done so for many years. But he should certainly not advise any gas manager to go in for its manufacture at the present time. With the price of sulphate so low, there was nothing in it. The results obtained by Mr. Sharman were very satisfactory; and no doubt the business paid them at Wisbech as it did his Company at Peterborough. But he (Mr. Barton) did not know that it would pay a small works to put down plant, and attempt to make sulphate just now. When the price ran up to £12 or £13 per ton, then he would advise them to go into it at once. He did not suppose they could get more than £9 for sulphate now; and, calculating the liquor at 7s. or 8s. a ton, he should say it would be better to sell the liquor than to make sulphate.

Mr. J. CARTER (Lincoln) said Mr. Barton's remarks did not fill him with any great amount of encouragement, because he happened to be in the position of starting a sulphate plant in the coming week. He was wondering how far Mr. Barton's argument would answer, because he presumed that, if the market for sulphate of ammonia was depressed (as it had been for some months past), the market for ammoniacal liquor would decline in precisely the same proportion, seeing that the liquor was only bought for the manufacture of sulphate.

Mr. BARTON explained that what he stated was that, if 7s. or 8s. per ton could be obtained for the liquor, he should not advise the putting down of sulphate plant at present prices; but if there was any difficulty in getting rid of the liquor, then he should say put down a plant. Sulphate at £9 per ton was like getting change for a sixpence. If the price increased, and anything above £10 per ton could be obtained, then it would be profitable. But, when they took into consideration the cost of the plant, the wear and tear, the anxiety attending the manufacture, and all the rest, really at present sulphate was not worth making; and it would be better to leave it to those who were already in the business.

Mr. WIMHURST asked Mr. Sharman what profit he made per ton of sulphate.

Mr. SHARMAN replied that the net profit was about £8 per ton—that was, less the fuel (which he deducted afterwards), about £7 10s.

Mr. WIMHURST said the price he was obtaining for liquor, under a contract expiring at the end of December next (which he should try to get renewed certainly to Midsummer), was 12s. 6d. per ton for 12-oz. liquor, and 11s. 3d. for 11-oz., at the works. This would bring them in this year about £150. If he turned this liquor into sulphate, allowing £6 per ton clear profit, it would only produce £132; so that they would be in the position of losing £18 a year, and the interest and wear and tear on the sulphate plant.

Mr. SHARMAN pointed out that Mr. Wimhurst was quoting on the present market price. Sulphate had been low for the last three or four months; but it was not so low at the first part of the year. The price he had obtained was higher than that mentioned by Mr. Barton. The market had been low before, and had again gone up; so that it was necessary to take one year with another. If the price of sulphate continued at the present low rate, many works would find it difficult to sell the ammoniacal liquor at all, on account of the cost of carriage. It would then be better to put up a small sulphate plant.

Mr. WIMHURST remarked that they had often been surprised at getting the price they had for liquor. They had obtained shillings more than their neighbours, although there was the same railway rate to pay.

Mr. MITCHELL pointed out that Mr. Sharman had mentioned, in his reply to Mr. Wimhurst, £7 to £8 per ton as the net profit; but, in his opening statement, he gave them the round figure of £100 as the profit obtained by manufacturing 32 tons of sulphate. [Mr. SHARMAN: After deducting the value of the liquor.] The figures £7 to £8 were misleading. What he had realized was £3 per ton, as compared with selling the liquor. All things being equal, and if the spent liquor could be disposed of without nuisance, it was bound to pay the gas manufacturer better to make sulphate than to sell the ammoniacal liquor, as somebody had to defray the carriage on it; and, as chemical manufacturers had not turned philanthropists, the gas company must get a lower return from their liquor by selling it. Mr. Barton had advised them, if they could get 7s. or 8s. per ton for the liquor, not to make sulphate while it was at £9 per ton; but, if sulphate continued at this figure, chemical manufacturers would not give them 7s. or 8s. for the liquor next year. The plant Mr. Sharman had in use was simplicity itself; and Mr. Hawkins had assured them that, in years past, he had realized as good results by similar plant as were obtained with the best plant of the present day. If this were so, it was no use going to the expense of the new type of plant.

Mr. SHARMAN mentioned that gas liquor was quoted in the JOURNAL for Sept. 10 at 6s. 6d. to 7s. 6d. per ton.

Mr. DRAGE stated that it had been proposed to put sulphate plant down at the East Dereham Gas-Works; but as there was some difficulty regarding the disposal of the spent liquor, the idea was abandoned. He was obtaining 6s. 6d. per ton for ammoniacal liquor; but, from the figures Mr. Sharman had given, he believed it would pay anyone to manufacture sulphate. He suggested that something should be done to make known to agriculturists in the Eastern Counties the value of sulphate of ammonia.

Mr. CARTER said the real question appeared to him to be this: If it would pay the manufacturer to buy the ammoniacal liquor of the gas company, and pay the heavy carriage, how came it that there should be any doubt as to gas companies working it up, when they had no carriage to pay?

Mr. HAWKINS thought the point that had to be considered, when it was proposed to enter upon sulphate manufacture, was whether or not they could keep the plant regularly going. Unless this could be done, instead of making 32 lbs. of sulphate per ton of coal (which was what ought to be produced), they were more likely to get only 20 lbs. This being so, it would be readily understood why manufacturers could pay for the conveyance of the ammoniacal liquor to their works, and make a profit on the sulphate, while small gas companies could not. He had no difficulty in keeping his works going regularly, and making 32 lbs. of sulphate per ton; but if less than this were produced, sulphate was being lost.

The PRESIDENT thought, in connection with this question, that the present outlook was a serious one. It was a matter that affected him personally. The price he had been receiving for ammoniacal liquor during the past two or three years was 1s. per barrel, loaded on to railway trucks. It cost him 3d. for cartage; and taking 1d. for filling, bungs, &c., left him only 8d. per barrel. He had been supplying 14 oz. liquor at 1s. per barrel; but the manufacturer had written to say that he could not now afford to give him this price. With regard to making sulphate of ammonia, unless the plant could be kept continuously at work, they could not get such good results as they would do

otherwise; and it was the same with other kinds of plant. He had consulted a friend who carbonized about 1400 tons of coal per annum—the same as he (the President) did—and he had given him the following figures as to the cost of manufacturing sulphate of ammonia:—

Coal carbonized per annum, 1400 tons.			
Sulphate made, 20 lbs. per ton, or 12½ tons, at £10 per ton	£125	0	0
Cost—			
Acid, 18 cwt. per ton of 1·750 sp. gr., on 12½ tons	£ 39	7	6
Labour, 20s. per ton, on 12½ tons	12	10	0
Fuel at 12s. 6d., including packing sulphate	7	16	3
Bags, 125 at 3d.	1	11	3
Cartage from works to station, at 2s. 6d. per ton	1	11	3
Wear, tear, and depreciation on £225	22	10	0
Interest, 5 per cent. on £225	11	5	0
	£ 96	11	3
Leaving for liquor	28	8	9
	£125	0	0

The manufacturing expenses worked out to £7 14s. 6d. per ton of sulphate, which was sold for £10. The liquor thus produced £28 8s. 9d. without charging anything for superintendence; and his friend was pleased to get this. He (the President) received for his liquor in 1892, £25 11s. 4d.; in 1893, £36 10s.; and in 1894, £38 10s. This made together £100 11s. 4d., or an average per annum of £33 10s. 5d. The expenses on this were: Filling barrels, bungs, &c., £5 16s. 8d.; and cartage, £8 15s. This made £14 11s. 8d. per annum; and left him £18 18s. 9d. for the liquor made out of 1400 tons of coal. Mr. Hawkins said that as much as 35 lbs. of sulphate could be produced from a ton of coal. Mr. Newbigging put the quantity at 28 lbs., or 1¼ tons per 100 tons of coal, which would work out to 17½ tons of sulphate from the coal he carbonized in a year. From a catalogue which had been recently furnished to gas managers, some figures were given as to sulphate manufacture which were very different to those his friend had supplied to him; and if sulphate could be made at the price stated in the book referred to, he thought that small works like his own would be able, with profit, to undertake its manufacture, even though they did not work continuously. The figures were: Acid, per ton of sulphate, £2 8s.; lime, 1s. 6d.; coke, 4s. 8d.; labour, 12s. 8d.; bags, 3s. 7d.; and wear and tear, 4s. 7d—making a total of £3 15s. This on 12½ tons of sulphate worked out to £46 17s. 6d. So that, if £10 per ton could be obtained, there would be a profit of £78 2s. 6d. on the liquor. If they could get a plant that would turn out sulphate at this cost, gas managers would have to put one down.

THE INCANDESCENT SYSTEM AS APPLIED TO PUBLIC LIGHTING.

The PRESIDENT remarked that unfortunately Mr. Jolliffe had not arrived; and therefore he would call on Mr. Drage to open the discussion on this subject.

Mr. DRAGE said that they commenced using incandescent burners for public lighting at East Dereham in July last year; and they had now 35 in use. The inhabitants were very pleased with them. The price paid for gas was 4s. 6d. per 1000 cubic feet; and they found there was a saving compared with the ordinary burners. The incandescent lamps had been burning 36,000 hours. Under the old system, they allowed a consumption of 7 cubic feet per hour; but the incandescent lamps only burnt 3¾ feet. At the beginning of the summer months, he removed the burners; and, on then testing them, he found the consumption was still 3¾ feet. This was a saving on the old burners of 3¼ cubic feet, which meant that a total of 117,000 cubic feet had been saved during the time the burners had been in use. At 4s. 6d. per 1000 cubic feet, this represented £24 6s. 6d. The mantles used during the lighting season averaged three per lamp; and 14s. per dozen was what they paid for them. He therefore put the cost of mantles used at £5 12s. In regard to the alteration required in the lamps, they purchased a lantern from the Incandescent Gas-Light Company, and saw what changes were necessary, and then altered their own lanterns at a cost of £3. Deducting these expenses from the saving in gas, they had a net saving of about £15 10s., besides having the benefit of the extra light. With these burners, anyone putting down fresh lighting plant would find that the lamps could be placed quite 75 yards, instead of 50 yards apart. He saw from the JOURNAL OF GAS LIGHTING that the Gas Inspector at Ipswich calculated that there was a saving of £10 16s. 8d. per annum on twelve large special lamps fitted with incandescent burners in lieu of governor burners. Replying to the President, Mr. Drage added that his bye-pass was always burning.

The PRESIDENT said he had fitted a few incandescent burners on the public lamps; but he had not found any saving in the consumption of gas. Perhaps, however, this was a peculiarity of the town of Sudbury. For instance, six or seven nights every moon, they did not light the lamps at all; and the bye-pass arrangement was burning the whole of that time, 24 hours per day. Then all the lamps in which the incandescent burners had been fixed were turned out at 11.30 p.m.; and the bye-pass in these lamps—22 or 23 of them—were burning some 19 or 20 hours a day when the light was not required. Further than this, he could prove there was no saving with such a system as theirs—he did not say there was no saving under ordinary conditions—in adopting the light. One of the lamps of the twelve on the Market Hill had a meter attached; and he found that it registered just as much gas with the incandescent burner, as it did previously fitted with one of Borradaile's 4-feet regulator burners. He attributed this to the bye-pass. However, he certainly thought the principal part of a town should be lighted by incandescent lamps.

Mr. DRAGE, in reply to Mr. Barton, said he tested his incandescent burners at a pressure of 18-10ths. He had the bye-pass in his lamps regulated to a consumption of 1 foot per nine hours. In his case, the ordinary lamps consumed 7 cubic feet per hour, while the President's only burned 4 feet, which made a vast difference.

Mr. C. BANHAM (Wymondham) suggested that it might be possible to apply self-lighting burners to incandescent lamps; and so do away with the bye-pass.

Mr. MITCHELL remarked that the bye-pass appeared to be a troublesome matter in connection with the incandescent system. He thought it was accepted on all hands that the incandescent burner would give a greater light per foot of gas than the ordinary burner. But the question they had to consider was whether the system was applicable to public lighting. Mr. Drage was the only member who had told them he had found it applicable in his case, and that there was a saving of gas. Saving or no saving, that was not a question for gas companies, but for local authorities, who had to pay for the gas whether it was consumed by an incandescent or an ordinary flat-flame burner. He should like to inquire whether there were any difficulties in applying the incandescent burners that did not exist with the ordinary burners? Was there any difficulty in keeping the bye-pass alight? Did the jerking of the tap in lighting and extinguishing the lamp put out the bye-pass, and so necessitate a lamplighter procuring a ladder to re-light it?

Mr. DRAGE replied that, during last season, only one or two of the bye-passes in his lamps were extinguished through a gale of wind. He used the chain arrangement, and not a tap, for lighting and putting out the lamps. At first he found that the chain, going through the glass, used to touch it, and upset the mantle. He then applied a piece of copper wire, so as to avoid friction; and he had not experienced trouble since.

Mr. MITCHELL remarked that he had only one incandescent burner in use; and he had experienced a difficulty through the jerking out of the bye-pass both when lighting and extinguishing. He thought that this question of incandescent lighting in the streets was really one for local authorities to take up; and it was for them to put up with both the difficulties and the expense. The difficulties appeared to be very few indeed; but the cost of the gas consumed by the bye-pass must be paid by the authorities. He thought it would be just as well if the authorities paid the gas companies for 5 cubic feet per hour, which would cover the normal consumption of 3¾ cubic feet and the gas used by the bye-pass. He did not think gas companies ought to be put to any trouble in this matter of public lighting at all.

Mr. DRAGE: The gas-works in my case are owned by the District Council.

Mr. SHARMAN related his experiences with an incandescent burner which he fixed in a lamp in the centre of the Market Place at Wisbech. He frequently found the bye-pass out; and to obviate the trouble that this involved, he made the bye-pass larger, which considerably raised the consumption of gas in keeping it going during the whole 24 hours. He also found that the destruction of the mantles was great; and at the end of the lighting season, he decided to remove the burner. However, after further experiments had been made, he might take the matter up again.

Mr. BEST was of opinion that, considering the wear and tear of the mantles, and the amount of gas wasted by the bye-pass, as far as gas companies were concerned, they would not be justified in adopting incandescent burners for street lighting.

Mr. BARTON had tried two of the incandescent lamps; but his experience had not been very satisfactory. There was a doubt in his mind whether these incandescent lamps diffused the light as well in the streets as indoors. He was inclined to think that the ordinary 5-feet burner diffused the light equally as well as the incandescent burner. With the latter, they obtained a glare of light inside the lantern; but there was not the diffusion of light that was obtained with an ordinary burner.

ELECTION OF OFFICE-BEARERS.

On the proposition of the PRESIDENT, seconded by Mr. J. MASON (Oakham), Mr. Drage was elected to the office of President for the ensuing year.

Mr. MITCHELL moved that Mr. Jolliffe, of Ipswich, be elected Vice-President.

Mr. WIMHURST seconded the motion; and it was unanimously carried.

Mr. CARTER could not say that he rose with any very great pleasure to submit the next proposition; and he was sure that Mr. Troughton would quite understand his feeling. For the past six or seven years, they had had the pleasure of re-electing their friend Mr. Wimhurst to the position of Honorary Secretary and Treasurer; but now, for the first time in the history of the Association, they had to propose another name for the office. This being so, he did not think they could find one in their ranks

more fitted for the position than Mr. Troughton, whose name he had pleasure in proposing.

Mr. MITCHELL seconded the proposition, which was adopted.

Mr. TROUGHTON, in response, assured the members that he should endeavour to do his best for the interests of the Association; and he hoped they would all support him by rallying round and volunteering papers for the meetings.

Messrs. Pike, Sharman, and Wimhurst were next elected members of the Committee; and Messrs. Panchen and Ellis were re-appointed Auditors.

THE SPRING MEETING.

The PRESIDENT-ELECT moved that the members of the Association visit East Dereham for their meeting in April next; mentioning that he had the support of the District Council in giving this invitation.

Mr. WIMHURST seconded the motion, which was agreed to.

VOTES OF THANKS.

The PRESIDENT proposed a hearty vote of thanks to the Directors of the Wisbech Gas Company for the cordial and hospitable manner they had received the Association.

Mr. BANHAM seconded the proposition, which was cordially agreed to.

Mr. MITCHELL said the members could not allow Mr. Wimhurst to relinquish his office without according him a hearty vote of thanks for the great amount of work he had done on their behalf during the time he had been their Honorary Secretary and Treasurer. He had put his heart and soul into the work; and certainly the Association would not have thriven through the years of infancy up to the present time had it not been for the extraordinary interest Mr. Wimhurst had taken all through in their affairs.

The PRESIDENT, in seconding the motion, hinted that the services of Mr. Wimhurst would, in all probability, be recognized in a more tangible form than by the passing of a mere vote of thanks.

The motion was carried by acclamation.

Mr. WIMHURST said he was much obliged to the members for the vote which had been so cordially passed. As he had said on a previous occasion, what he had done for the Association had been a labour of love.

The services during the past year of the President and the various officials were also suitably acknowledged; and this concluded the proceedings.

The members with several friends afterwards dined at the Rose and Crown Hotel—the Mayor and some of the Directors of the Gas Company honouring them by their presence. A short toast list was subsequently gone through. The Mayor, in proposing "Success to the Eastern Counties' Gas Managers' Association," associated with the toast the name of the retiring Secretary. In responding, Mr. Wimhurst stated that the meeting at which the Association was formed was held at Peterborough in 1888. There were then enrolled 25 members from a district reaching from Mansfield in the North-West to Chelmsford in the South-East. The Association now numbered 69 members. He had arrived at the end of his apprenticeship in the office of Secretary; having served the Association in that capacity for seven years. He was about to vacate the position; and he had the greatest confidence that his successor, Mr. Troughton, would faithfully carry on the work.

THE BRITISH ASSOCIATION MEETING.

The President's Address.

The Sixty-fifth Annual Meeting of the British Association was opened at Ipswich last Wednesday. The retiring President, the Marquis of Salisbury, was unable to be present to introduce his successor—Sir DOUGLAS GALTON; but the duty was performed by Lord Kelvin, who referred to Sir Douglas as having been one of the mainstays of the Association during the past quarter of a century.

The PRESIDENT, amid hearty cheering, took the chair; and at once proceeded to deliver his Inaugural Address, which, as no doubt had been anticipated, was a long and learned one. It touched upon many fields of scientific research; but in regard to the subjects affecting the industries to which the JOURNAL is devoted, it was almost barren. Six Douglas commenced by recalling the agreeable memories of the former meeting of the Association at Ipswich 44 years ago; and then followed with a few words on the loss which science has sustained by the death of the Right Hon. T. H. Huxley. The foundation of the Association in September, 1831, was alluded to, and its democratic constitution enlarged upon. In taking a rapid glance at the condition of sciences at its formation, the President remarked: "When we consider how completely the whole habit of mind of the populations of the Western world has been changed since the beginning of the century, from willing acceptance of authority as a rule of life to a universal spirit of inquiry and experimental investigation, is it not probable that this rapid change has arisen from society having been stirred to its foundation by the causes and consequences of the French Revolution? One of the very earliest practical results of this awakening in France was the conviction that the basis of scientific research lay in the accuracy of the standards by which observations could be compared." This led him to the principles which were then laid down as a basis for the measurements of length, weight, and capacity. He mentioned that the metric system did not come into full operation in France till 1840; and it was now adopted by all countries on the Continent of Europe, except Russia. He claimed for the Association that they early recognized the importance of uniformity in the record of scientific facts, as well as the necessity for an easy method of comparing standards, and for verifying differences between instruments and apparatus required by various observers pursuing similar lines of investigation.

Some remarks upon the observatory at Kew, the Geological Survey, and achievements in geography brought the President to the subject of chemistry, upon which he said: The report made to the Association on the state of the chemical sciences in 1832 says that the efforts of investigators were then being directed to determining with accuracy the true nature of the substances which compose the various products of the organic and inorganic kingdoms, and the exact ratios by weight which the different constituents of these substances bear to each other. But since that day, the science of chemistry has far extended its boundaries. The barrier has vanished which was supposed to separate the products of living organisms from the substances of which minerals consist, or which could be formed in the laboratory. The number of distinct carbon compounds obtainable from organisms has greatly increased; but it is small when compared with the number of such compounds which have been artificially formed. The methods of analysis have been perfected. The physical, and especially the optical, properties of the various forms of matter have been closely studied, and many fruitful generalizations have been made. The form in which these generalizations would now be stated may probably change, some, perhaps, by the overthrow or disuse of an ingenious guess at Nature's workings, but more by that change which is the ordinary growth of science—viz., inclusion in some simpler and more general view. In these advances, the chemist has called the spectroscope to his aid. Indeed, the existence of the British Association has been practically coterminous with the comparatively newly developed science of spectrum analysis; for though Newton, Wollaston, Fraunhofer, and Fox Talbot had worked at the subject long ago, it was not till Kirchhoff and Bunsen set a seal on the prior labours of Stokes, Angström, and Balfour Stewart that the spectra of terrestrial elements were mapped out and grouped; that by its help new elements were discovered, and the idea was suggested that the various orders of spectra of the same element are due to the existence of the element in different molecular forms—allotropic or otherwise—at different temperatures. But, great as have been the advances of terrestrial chemistry through its assistance, the most stupendous advance which we owe to the spectroscope lies in the celestial direction.

Passing over the President's references to astronomy, the address proceeded: If we turn to the sciences which are included under physics, the progress has been equally marked. In optical science in 1831, the theory of emission, as contrasted with the undulatory theory of light, was still under discussion. Young, who was the first to explain the phenomena due to the interference of the rays of light as a consequence of the theory of waves, and Fresnel, who showed the intensity of light for any relative position of the interference waves, both had only recently passed away. The investigations into the laws which regulate the conduction and radiation of heat, together with the doctrine of latent and of specific heat, and the relations of vapour to air, had all tended to the conception of a material heat, or caloric, communicated by an actual flow and emission. It was not till 1834 that improved thermometrical appliances had enabled Forbes and Melloni to establish the polarization of heat, and thus to lay the foundation of an undulatory theory for heat similar to that which was in progress of acceptation for light. Whewell's report in 1832 on magnetism and electricity shows that these branches of science were looked upon as cognate, and that the theory of two opposite electric fluids was generally accepted. . . . In electricity in 1831, just at the time when the British Association was founded, Faraday's splendid researches in electricity and magnetism at the Royal Institution had begun with his discovery of magneto-electric induction, his investigation of the laws of electro-chemical decomposition, and of the mode of electrolytical action. But the practical application of our electrical knowledge was then limited to the use of lightning conductors for buildings and ships. Indeed, it may be said that the applications of electricity to the use of man have grown up side by side with the British Association. One of the first practical applications of Faraday's discoveries was in the deposition of metals and electro-plating, which has developed into a large branch of national industry; and the dissociating effect of the electric arc, for the reduction of ores, and in other processes, is daily obtaining a wider extension. But probably the application of electricity which is tending to produce the greatest change in our mental and even material condition is the electric telegraph and its sister, the telephone. The knowledge of electricity gained by means of its application to the telegraph largely assisted the extension of its utility in other

directions. The electric light gives, in its incandescent form, a very perfect hygienic light. Where rivers are at hand, the electrical transmission of power will drive railway trains and factories economically, and might enable each artisan to convert his room into a workshop, and thus assist in restoring to the labouring man some of the individuality which the factory has tended to destroy. In 1843, Joule described his experiments for determining the mechanical equivalent of heat. But it was not until the meeting at Oxford, in 1847, that he fully developed the law of the conservation of energy, which, in conjunction with Newton's law of the conservation of momentum, and Dalton's law of the conservation of chemical elements, constitutes a complete mechanical foundation for physical science. Who, at the foundation of the Association, would have believed some far-seeing philosopher if he had foretold that the spectroscope would analyze the constituents of the sun, and measure the motions of the stars; that we should liquefy air, and utilize temperatures approaching to the absolute zero for experimental research; that, like the magician in the "Arabian Nights," we should annihilate distance by means of the electric telegraph and the telephone; that we should illuminate our largest buildings instantaneously, with the clearness of day, by means of the electric current; that by the electric transmission of power we should be able to utilize the Falls of Niagara to work factories at distant places; that we should extract metals from the crust of the earth by the same electrical agency to which, in some cases, their deposition has been attributed? These discoveries and their applications have been brought to their present condition by the researches of a long line of scientific explorers, such as Dalton, Joule, Maxwell, Helmholtz, Herz, Kelvin, and Rayleigh, aided by vast strides made in mechanical skill. But what will our successors be discussing 60 years hence? How little do we yet know of the vibrations which communicate light and heat! Far as we have advanced in the application of electricity to the uses of life, we know but little even yet of its real nature. We are only on the threshold of the knowledge of molecular action, or of the constitution of the all-pervading ether. It is only within the last few years that we have begun to realize that electricity is closely connected with the vibrations which cause heat and light, and which seem to pervade all space—vibrations which may be termed the voice of the Creator calling to each atom and to each cell of protoplasm to fall into its ordained position, each, as it were, a musical note in the harmonious symphony which we call the universe.

Among the other subjects dealt with was bacteriology, in the course of his remarks upon which, Sir Douglas observed that the early reports to the Association show that the laws of hydrostatics, hydrodynamics, and hydraulics necessary to the supply and removal of water through pipes and conduits had long been investigated by the mathematician. But the modern sanitary engineer has been driven by the needs of an increasing population to call in the chemist and the biologist to help him to provide pure water and pure air. The purification and the utilization of sewage occupied the attention of the Association as early as 1864, and between 1869 and 1876 a Committee of the Association made a series of valuable reports on the subject. It was not till the chemist called to his aid the biologist, and came to the help of the engineer, that a scientific system of sewage purification was evolved. Dr. Frankland many years ago suggested the intermittent filtration of sewage; and Mr. Baldwin Latham was one of the first engineers to adopt it. But the valuable experiments made in recent years by the State Board of Health in Massachusetts have more clearly explained to us how by this system we may utilize micro-organisms to convert organic impurity in sewage into food fitted for higher forms of life. To effect this, we require in the first place a filter of any material which affords numerous surfaces or open pores; and secondly, that after a volume of sewage has passed through the filter an interval of time be allowed, in which the air necessary to support the life of the micro-organisms is enabled to enter the pores of the filter. Thus this system is dependent upon oxygen and time. Under such conditions, the organisms necessary for purification are sure to establish themselves in the filter before it has been long in use.

While admitting that the sanitary engineer has done much to improve the surface conditions of towns, to furnish clean water, and to remove sewage, Sir Douglas remarked that he has as yet done little to purify town air. Fog is caused by the floating particles of matter in the air becoming weighted with aqueous vapour. Some particles, such as salts of ammonia or chloride of sodium, have a greater affinity for moisture than others. We shall suffer from fog so long as refuse is stored in towns to furnish ammonia, or so long as the street surfaces are allowed to supply dust, of which much consists of powdered horse manure, or so long as the products of combustion are sent into the atmosphere. Therefore, when mechanical traction has been adopted for vehicles in towns, one cause of fog will be largely reduced. And by diminishing black smoke, black fogs will be also diminished. In manufactories, smoke may be prevented, either by care in firing, by using smokeless coal, or by washing the soot out of the products of consumption in its passage along the flue leading to the main chimney-shaft. The black smoke from kitchens may be avoided by the use of coke or of gas. But so long as we retain the hygienic arrangement of the open fire in our living-rooms, the President said he despairs of finding a fireplace, however well constructed, which will not be used in such a manner as to cause smoke, unless, indeed, the chimneys were reversed and the fumes drawn into some central shaft, where they might be washed before being passed into the atmosphere. Electricity as a warming and cooking agent would be convenient, cleanly, and economical when generated by water power, or possibly wind power; but it is at present too dear when it has to be generated by means of coal. He can conceive, however, that our descendants may learn so to utilize electricity that they, in a future century, may be enabled by its means to avoid smoke in their towns.

Touching upon the relation of mechanical engineering and chemistry, the President pointed out that the development of the iron industry is due to the association of the chemist with the engineer. The introduction of the hot blast by Neilson, in 1829, in the manufacture of cast iron had effected a large saving of fuel. But the chemical conditions which affect the strength and other qualities of iron, and its combinations with carbon, silicon, phosphorus, and other substances, had at that time scarcely been investigated. In 1856, Bessemer brought before the British Association at Cheltenham his brilliant discovery for making steel direct from the blast-furnace. This discovery, followed by Siemens's regenerative furnace, by Whitworth's compressed steel, and by the use of alloys and by other improvements too numerous to mention, revolutionized the conditions under which metals are applied to engineering purposes.

Locomotion and explosives next received attention; and then Sir Douglas pointed to the fact that our neighbours and rivals rely largely upon the guidance of the State for the promotion of both science teaching and research—referring especially to what is being accomplished in Germany. In Great Britain, our records show that hitherto, in its efforts to maintain its position by the application of science and the prosecution of research, England has made marvellous advances by means of voluntary effort; and while the increasing field of scientific research compels us occasionally to seek for Government assistance, it would be unfortunate if, by any change, voluntary effort were fettered by State control. The President mentioned, in this connection, that the Association has contributed £60,000 to aid research since its formation; and he also alluded to the grants made by the Treasury to assist voluntary effort.

The address concluded with a reference to the ever-widening field of usefulness for the Association, and an expression of the confidence of the writer that its future records will chronicle a still greater progress than that already achieved.

A hearty vote of thanks was passed to the President for his address.

At a meeting of the General Committee of the Association on the same day, the report of the Council, which was read by Professor Vernon Harcourt, stated that the election of Sir Douglas Galton as President for the year deprived them for the future of his services as General Secretary; and the Council recorded their grateful sense of the unfailing zeal and energy displayed by him in the affairs of the Association during a tenure of office extending over 24 years. Professor Schäfer has been appointed General Secretary.

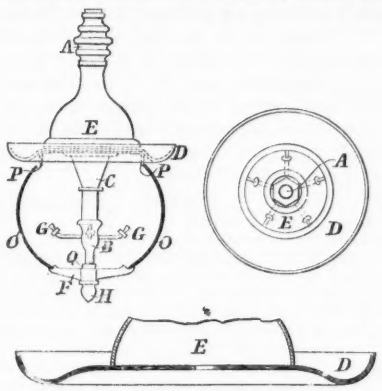
Suggested Purchase of the Kington Gas and Water Works by the Urban District Council.—At the last monthly meeting of the Kington Urban District Council, the following resolution was carried unanimously: "That a Committee be formed to inquire into the present supply of light and water to the town, with a view to ascertaining whether it would not be more advantageous if these were placed under the control of the Council; and that the Committee be empowered to obtain expert evidence, if it is deemed necessary to the inquiry."

The Dorking District Council and the Water Company.—The District Council of Dorking recently asked the Local Government Board if, seeing that several complaints had been made as to the inadequacy of the water supply, they would hold an inquiry into the question of whether the local Water Company are able and willing to furnish water proper and sufficient for all reasonable purposes. The Board have replied that the question is not one which they are empowered to determine; and it will have to be settled in the manner provided by section 52 of the Public Health Act, 1875. At the meeting of the Council on the 5th inst., the Special Committee who have the matter in hand recommended that a notice be served on the Company, to the effect that the Council intend commencing to construct water-works within the limits of the supply of the Company, and generally to carry out the requirements of section 52 of the Act. The Council were also recommended to reappoint the Committee to do what was necessary, especially with reference to the matter being referred to arbitration. In moving the adoption of the report, Mr. Young said there seemed no alternative but to give the Company notice that the Council intended to provide works of their own. In the course of the discussion, it was stated that it was apparent to the Committee, as it must long have been to the Council, that, in the language of the Act, the Company were not able to supply the place with water. Willing they might be, but able they apparently were not. Therefore it was incumbent on the Council to see that the public interests were not neglected. The Act went on to say that, although an urban authority might supply their district with water, where there was an existing company having a monopoly, it was necessary to give them notice of what the authority intended doing. If the Dorking Company resisted, and said they were able and willing to supply the town, the matter had to be referred to arbitration, and a public inquiry would have to be held, presided over by Arbitrators, who would decide whether the Company had or had not fulfilled their obligations. The report was adopted.

REGISTER OF PATENTS.

Reflecting Gas-Lights.—Bray, G., of Leeds. No. 16,297; Aug. 27, 1894.

As shown in the engraving, the main pendant of the light consists of a centre pipe A, provided with a connection B, having two or more branches G for lights. A short distance above the connection B is an inverted cone C, upon which rests a reflector D, having a raised centre.



The reflector may be punctured with holes round its centre, through which the products of combustion pass, and are diffused by coming in contact with the concave baffler or hollow vase E. The products of combustion pass away through the space intervening between the top of the reflector D and the vase E, and thus lessen the blackening of the ceiling above that would otherwise be the case. Above E is an ornamental cap, through which proceeds the main pendant A.

In combination with the above, the patentee specifies to use the arrangement for supporting and staying the glass globe O, as described in patent No. 20 of 1893, in which case the ornamental connection B is extended and prepared to receive the sleeve Q, supporting the globe holder F, which is kept in position by the knob H—the globe being stayed at the top by guides P, attached to the reflector.

Disc Engine, Suitable as a Water-Meter.—Kent, W. G., of High Holborn, W.C. No. 18,286; Sept. 26, 1894.

The working chamber or so-called cylinder of this disc engine is formed in two parts; the bottom being a flat dish, with a cylindrical boss on its underside, to give sufficient thickness for the hollow which receives the ball at the centre of the so-called disc or piston. The sides of the upper part of the cylinder are formed of a portion of a sphere lying between two parallel planes, one of which passes through the centre. The top consists of a cone pointing downwards; the apex being cut off so as to leave a circular hole through which the spindle and a portion of the ball on the piston project. The upper part fits into a recess round the inner edge of the rim of the dish-like bottom; or it may be screwed in so as to allow of adjustment, to compensate for the wear of the ball; or the same object may be effected by screwing the boss into the lower part of the cylinder, instead of casting it in one piece with it. The upper part of the cylinder has on its outside three or more vertical radial wings; and the outer edges of these, and of the rim of the dish, fit the inside of the casing which is slightly conical. The partition in the cylinder is fixed to one of the radial wings in the manner described in patent No. 10,981 of 1893. The inlet and outlet pipes to the casing are diametrically opposite to each other, and the inlet and outlet ports to the cylinder are formed, as usual, one on each side of the partition. Additional outlet ports are also formed in the top and bottom of the cylinder. The so-called disc or piston consists of a cone pointing downwards, and having a ball at its apex. It is slotted to receive the partition; and on the outlet side it is notched to receive a friction or thrust roller which bears against the partition. The gearing which works the counting and recording apparatus is contained in an oil-filled box carried by the cover of the outer casing. It is actuated by a worm wheel driven by a worm on a vertical spindle passing down through the cover. This spindle has a conical end working in a corresponding bearing formed of graphite. The downward thrust of the worm is taken by a bow spring.

Incandescent Gas-Burners.—Redfern, G. F.; a communication from La Compagnie Parisienne du Bec Deselle-Gillet. No. 20,093; Oct. 20, 1894.

Two arrangements of this incandescent gas-burner are shown in fig. 1; while fig. 2 is a vertical section of a burner-cap with two mantles.

A cylindrical tube A is adapted to receive a cap B, the upper part of which is furnished with orifices or slits. A rod D is fixed to the top of the cap, and is provided at its upper end with a stirrup or support having eyes or holes in it to receive ligatures of asbestos thread, by means of which the upper part C of the mantle M is attached. The support is placed on a shoulder of the rod D after the incineration of the mantle, and is maintained in position by a nut. The asbestos covering for the rod D can be in the form of agglomerated powder, but is most suitable as thread wound around it. By coating the asbestos covering, says the patentee, with one or more layers of any suitable silicate—such as silicate of soda or silicate of potash—its resistance is considerably augmented; and the asbestos covering can also be impregnated with metallic salts or oxides for the purpose of modifying the tint of the light emitted by the mantle. Oxide of didymium (for example), which gives a rose colour, may be employed for the purpose of partially neutralizing or modifying the green rays emitted by certain of the oxide constituents of the mantle.

Sometimes two mantles M M¹ are employed, arranged concentrically on the central rod D, for the purpose of obtaining a more powerful light, as shown in fig. 2. The two mantles may be of the same chemical composition, and may both emit rays of the same tint; or one of them may be composed of metal oxides giving specially coloured rays—such, for example, as oxide of didymium, which produces rose-coloured rays, for the purpose of modifying the tint of the rays emitted by the other mantle. When two mantles are employed, the burner may have either a single ring or row of openings, or two such rings as shown.

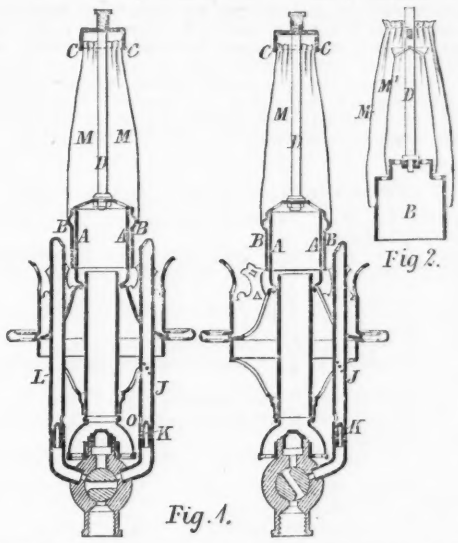


Fig. 2.

Fig. 1.

For igniting the gas issuing from the burner an outside tube is provided, as shown in fig. 1, having a number of holes arranged above, or as a continuation of, a small Bunsen burner K which branches laterally from the gas supply cock. In the engraving, the perforated hole and the Bunsen burner are shown as formed of one tube J. With this arrangement, the gas (which burns for a short time in the tube J before reaching the mantle) does not form any carbonaceous deposit, as it is well mixed with air and it can be ignited with a match, thereby obviating the necessity of a pilot flame. The upper end of the tube J is bevelled and slightly curved so that the igniting jet issues horizontally from it. The tube, at its lower part, communicates with a passage which can communicate with the plug of the cock.

L is a bye-pass also branching laterally from the cock, and similar to the tube J, with the exception that it is not perforated on its periphery except at the lower end, just above the gas nozzle. This arrangement may be dispensed with, if desired, as shown in the right-hand modification. With burners of this kind, says the patentee, the gas may be automatically ignited by an arrangement depending for its action on the property possessed by porous bodies (especially finely divided platinum and palladium) of absorbing gases, and to this purpose he arranges within the refractory mantle a bag of fine platinum gauze containing platinum or palladium black.

Manufacture of Oil Gas.—Mayer, F., of Baltimore, U.S.A. No. 13,230; July 9, 1895.

The claims for this invention (which is not described apart from the eight sheets of drawings accompanying the specification) are as follows: 1. The combination of a retort chamber containing a series of vertical retorts; a furnace situated under the retort chamber, and separated from it by a perforated arch; a body of brickwork in the rear of the furnace, having circuitous passages therein, through which the products of combustion from the retort chamber pass to heat it; a vaporizing chamber erected over the brickwork, having circuitous passages therein, which form a continuation of those in the brickwork, and which lead finally to a stack; and gangs of vaporizing pipe, which are partially or wholly within the vaporizing chamber, leading ultimately to the upper ends of the retorts, to convey hydrocarbon vapours from the top of the vaporizing chamber to the top of the retorts. 2. A furnace covered by a perforated arch, combined with a retort chamber erected over the arch; the system of vertical retorts situated in the retort chamber, having wings which are cut away at certain points, to give continuity to the various spaces exterior to the retorts, and between them and the brickwork of the retort chamber; and plates which form partitions in the retort chamber between the rows of retorts therein, provided with spaces or openings through which the products of combustion ascend to the upper portion of the retort chamber. 3. The combination of a vaporizing chamber and a series of vaporizing pipes within the chamber with their ends projecting from it; a box to which the ends of the vaporizing pipes are connected; a supply pipe supported within the box, having knife-edged or conducting plates, the points of which are over the ends of the pipes; and overflow apertures, and a pipe, for conveying hydrocarbon to the supply pipe. 4. The combination of a series of vaporizing pipes connected to a box at their ends; a supply pipe in the box, having knife-edged triangular plates on its lower side with the points over the ends of the vaporizing pipes; a conveying pipe to feed the supply pipe; and sustaining bolts, which pass through stuffing boxes in the top of the box and are adjustable in length, whereby the supply pipe may be levelled in the box without reference to its position.

Incandescent Mantles for Gas-Lamps.—Crocker, S. H., of Furnival Street, E.C. No. 13,638; July 16, 1895.

This invention consists in forming incandescent mantles for lamps from threads spun of material which, in its natural or raw state of fibres or filaments, is loaded with a solution for yielding refractory earths.

The organic matter being subsequently removed by burning, leaves behind the refractory compounds in approximately the same shape as the fabric obtained before.

To carry out his invention, the patentee takes any suitable material of a fibrous nature in its raw state, and thoroughly loads or incorporates with it the refractory earths, after which they may be dried and spun into threads, and these threads made up into a mantle of suitable shape by weaving, netting, or like operations.

In some cases instead of forming the loaded raw material directly into threads, it is first made into thin flat sheets or tissue, by felting after the manner of making paper; and from these sheets strips or shreds may be cut which can be spun or twisted into threads. By treating the fibres as described—that is to say, in their raw or natural state—they become loaded "in a very even and uniform manner, so that when woven or netted, they produce a textile fabric or base in which the refractory compounds are equally distributed throughout."

APPLICATIONS FOR LETTERS PATENT.

16,377.—LEES, W., "Steam or water valves; also applicable to water-gauges." Sept. 2.

16,383.—CRAIG, J., "Connecting taps and pipes by mechanical contrivances to lead, brass, iron, and other pipes without the use of solder." Sept. 2.

16,424.—ELLIOTT, R. L., "Gas and other internal combustion engines." Sept. 2.

16,428.—RIORDAN, T. V., "Gas-burners." Sept. 2.

16,471.—WALDER, T. J., "Manufacture of water and coal gas." Sept. 3.

16,473.—HOLT, H. P., "Gas or oil motor cars." Sept. 3.

16,475.—HOLT, H. P., "Governing apparatus for gas or oil traction engines." Sept. 3.

16,480.—TALBOT, R. M., "Constant-service water-supply system." Sept. 3.

16,502.—DUCRETET, E., and LEJEUNE, L., "Production and utilization of acetylene." Sept. 3.

16,509.—INGLE, J., "Gas-branding machine." Sept. 3.

16,539.—YOUNG, W., "The production of illuminating gas from liquid hydrocarbons and apparatus therefor." Sept. 4.

16,556.—GASS, A., "Gas-engines." Sept. 4.

16,587.—HOOKHAM, G., "Manufacture of gas-cylinders." Sept. 4.

16,609.—CAMPBELL, H., "Gas and oil motor engines." Sept. 5.

16,642.—DEIMEL, F., "Incandescent gas-burners, for use both indoors and in the open air." Sept. 5.

16,682.—CHESTER, W. R., "Indicator to be attached to gasholders, tanks, and other vessels of this description." Sept. 6.

16,691.—CAMPE, R., "Generator for acetylene gas lamps." Sept. 6.

16,705.—COUTTOLENC, M. E., "Regulating apparatus applicable principally to incandescent gas-burners." Sept. 6.

16,722.—HARFF, M., and SIEBERT, A., "A device for releasing automatically the closing or stopping mechanism in gas or water supply pipes." Sept. 6.

16,728.—EASTWOOD, C., and M'EWEN, C. J., "Apparatus for charging gas-retorts." Sept. 6.

16,730.—WHEATLEY, W. H., "Incandescence burners." A communication from C. Schmid. Sept. 6.

16,744.—FOX, W., "Improvement of coal gas or other illuminating gases." Sept. 7.

16,786.—BOULT, A. J., "Incandescence gas-lamps." A communication from E. Dispot. Sept. 7.

16,798.—ARMSTRONG, J. T., and BAILEY, M., "Burners for gas and other lamps." Sept. 7.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

Regulation of Consumption in Incandescent Gas-Burners.

SIR,—With reference to Mr. H. E. Jones's publication, in your last issue, of the results of my tests of the incandescent gas-burners at different consumptions, it may perhaps be useful to attempt to give some explanation of the variation of the illuminating power at different consumptions.

It is obvious that the ratio between illuminating power and gas consumed must depend upon the heat of the flame, and the efficiency of the "mantle." When the proportion of gas consumed exceeds a certain limit, two things occur—both depending on increased gas consumption. There is the increased height of the Bunsen flame, which, extending beyond the "mantle," does not develop its corresponding proportion of light; and there is also a shifting of the zone of maximum combustion, and of maximum heat, to a higher elevation, with consequently a less proportion of the mantle heated to a degree to give maximum incandescence. A larger mantle would deal with this emergency; but a simpler method is the adoption of a governor to regulate the gas consumption to a proportion calculated to afford the best results. I believe the Incandescent Gaslight Company provide such appliances at a small additional cost.

Stepney, Sept. 11, 1895. H. LEICESTER GREVILLE, F.I.C., &c.

A Generous Offer.—The question of providing a better water supply for Milverton has for some years occupied the attention of the local public authorities. At the last monthly meeting of the Wellington Rural District Council, it was announced that Miss Broadmead, of Milverton, is willing to place £1000 at the disposal of the Council for the purpose of securing a suitable supply, provided the Council would undertake all additional expense (if any) in the completion of the work, and afterwards hand over the management and maintenance thereof to the Parish Council. The offer was accepted, with hearty thanks.

MISCELLANEOUS NEWS.

THE DVORKOVITZ OIL-GAS ENRICHMENT PROCESS AT BRADFORD.

A Criticism of Mr. Lewis T. Wright's Report.

In last week's JOURNAL, we published the supplementary report by Mr. Lewis T. Wright to the Bradford Corporation Gas Committee upon the experiments in oil enrichment of gas by the Dvorkovitz process, as well as communications to the Committee on the subject by Mr. W. Wood, the Corporation Gas Engineer, and Mr. Isaac Smith. A further report dealing with the points raised by Mr. Wright has been addressed to Mr. Isaac Smith by Messrs. T. Newbigging and Son, of Manchester; and it reads as follows:—

5, Norfolk Street, Manchester, Sept. 7, 1895.

ISAAC SMITH, Esq., Bradford.

Sir,—We are duly in receipt of the copy of Mr. Lewis T. Wright's "supplementary report" dealing with the question of the enrichment of ordinary coal gas by means of cannel, and comparing the cost of this with the cost of enrichment by the use of the Dvorkovitz oil-gas process, at the Thornton Road station of the Bradford Corporation Gas-Works; and we make the following observations thereon.

You will observe that Mr. Wright states in his report that the result at which he has arrived is "an estimate based upon actual working experience on a large scale." It would be interesting to know where this "actual working experience" has been obtained.

In estimating the cost per candle of enriching by means of cannel, Mr. Wright makes the mistake of basing his calculation on the full 23 candles' value of the cannel gas, instead of taking the value—18¾ candles—of the mixed gases. Had he done this, his cost per candle would have come out to 0·98d., instead of 0·81d. However, we will deal with the estimate on Mr. Wright's lines.

This is taking Mr. Wright's figure of 0·76d. per candle as the cost of the oil enrichment. But, in reality, the saving would be very much more than this. It will be seen on reference to our report of the 6th ult. [see *ante*, p. 404] that we make the cost of enrichment by the oil process 0·367d. per candle. The difference therefore between enrichment by cannel, 0·952d., and enrichment by oil, 0·367d., is 0·585d. per candle; and 0·585d. × 3 = 1·755d., the amount of the saving per 1000 cubic feet on an enrichment of 3 candles. So that 1,506,822,000 cubic feet × 1·755d. per 1000 cubic feet = £11,018 per annum.

In arriving at the cost of enrichment by the oil process, we differ from Mr. Wright on two vital points—(1) As to the price of the oil; and (2) as to the value of the bye-products. Mr. Wright took the price of the oil at 3·8d. per gallon—the price at which Messrs. Besseler, Waechter, and Co., of London, offer to supply it. We took the price at 3·25d. per gallon, for the reason that the oil actually used in the experiments was of inferior quality. In regard to this, Messrs. Besseler, Waechter, and Co., writing to the Town Clerk, July 31, say: "We are not at all surprised to learn that the results obtained from the waggon of oil recently supplied to you were not anything like as good as those obtained from Nobel's oil, which was supplied to the Corporation in February last. We regret we were unable to supply you with Nobel's oil on the last occasion; but you will understand that the oil for which we quoted in our last is Nobel's oil, the same as we supplied to you in February." We had a further reason for taking the price of 3¼d. The trials of other oil-enrichment processes were made on the basis of oil at 3¼d. per gallon; and, as comparisons were to be made, it was only fair that the price in this case should be the same.

As regards the value of the bye-product, which we put at 4·695d. per gallon, we have given the data in our report on which this value was arrived at; and our figures are unrefuted. It has been stated that we omitted to make an allowance for the cost of distillation. But this is not so, as we allowed for this by quoting something lower than the current rates for the secondary products.

Mr. Wright persistently ignores the fact that the bye-product obtained in the Dvorkovitz process is a totally different thing to that obtained in other oil-gas processes. The analysis by Mr. Craven, given in our report, is sufficient proof that the two products are entirely dissimilar. On the face of it, it is clearly wrong to say, as Mr. Wright does, that a liquid containing 23 per cent. of benzol and 12½ per cent. of naphtha, not to mention the heavy oils and pitch, is only worth 1·71d. per gallon; the market price of both benzol and naphtha being close on 1s. per gallon. The statement carries its own refutation. And even if it be assumed that the value which we put upon the bye-product is a high one, and should be reduced, there is sufficient room for this being done, and still leave a handsome margin of profit in favour of the oil process.

In his calculation, he adopts the following figures, among others: Price of cannel of an enriching power of 23 candles, 13s. per ton; yield of tar, 19½ gallons, at 1·2d. per gallon; yield of ammoniacal liquor, 23½ gallons, at 0·84d. per gallon. Unless these prices and quantities hold good for Bradford, his calculation is worthless. We agree with Mr. Wood, the Corporation Gas Engineer, when he says that cannel of this quality delivered at the Bradford Gas-Works cannot be obtained at 13s. per ton. Similarly, a yield of 19½ gallons of tar obtained in ordinary working from cannel in the Bradford district is out of the question; and that the ammoniacal liquor could be sold at 0·84d. per gallon is equally wide of the mark. Mr. Wright makes a special note of his having credited the cannel coke at only 3s. 4d. per ton. As a matter of fact, the coke from many high-class cannels is absolutely worthless.

So much for the figures on which Mr. Wright bases his "estimate." If these are fallacious, as we believe they are, his cost of enrichment by cannel falls to the ground. Correcting the prices and quantities as above, and accepting for the moment the other figures (which we have not the means at hand of verifying) as to working cost, given by Mr. Wright, the calculation comes out at 0·952d. as the cost per candle

of enrichment by cannel, as against Mr. Wright's figure of 0·81d. per candle, thus—

Net Cost of Cannel per Ton.

	Pence per Ton.		Pence per Ton.
Cannel, at 14s. 6d. per ton	174·00	Tar, 14 gallons, at 1·2d. per gallon	16·80
Fuel used in furnaces, 4 cwt., at 7s. 6d. per ton	18·00	Ammoniacal liquor, 23½ gallons, at 0·5d. per gallon	11·75
		Coke, 11·6 cwt., at 3s. 4d. per ton	23·20
	192·00		51·75
	51·75		
Net cost of cannel per ton	140·25		

Cost of Gas per 1000 Cubic Feet.

	Pence per 1000 cub. ft.
Net cannel as above (producing 10,000 cubic feet per ton)	14·025
Purification, salaries, wages, repairs, maintenance—average of three years ending 1893	6·171
Interest and sinking fund	1·918
	22·114
Less spent oxide	0·226
Cost per 1000 cubic feet into gasholder	21·888

Or 0·952d. per candle of enrichment, the total enrichment being 3 candles—viz., from 15¾ candles to 18¾ candles illuminating power.

Comparing this figure of 0·952d. with Mr. Wright's figure of 0·76d. as the cost per candle (according to his method of estimation) of enrichment by the Dvorkovitz oil process, the difference or saving in cost is 0·952d. − 0·76d. = 0·192d. per 1000 cubic feet per candle, or 0·192d. × 3 = 0·576d. for the total enrichment of 3 candles required. The saving, therefore, by adopting the oil process in question, on the 1,506,822,000 cubic feet (quantity of gas made at Bradford for the year to March, 1894), would be £3616 per annum.

We notice that Mr. Wright makes a point when speaking of the enrichment of coal gas, whether by cannel or by oil, of always stating that the candle enrichment is "per 1000 per candle per 5 cubic feet," in allusion to the 5 cubic feet of gas supplied to the test-burner. There is no justification for so stating it. It is only a way of "darkening counsel;" and we can only conclude that he is committed to this absurd formula in having originally advised the Gas Committee that Mr. Wood's ascertained figure of cost per candle "was altogether wrong, and should be multiplied by five!" He has doubtless since found out his mistake; but the precious "5" must be retained to lend a colouring of accuracy to what was a serious blunder, and which, indeed (if we are rightly informed), has been the chief cause of the present wranglings.

Even assuming that a suitable cannel were offered to the Corporation to-day, at a price which would reduce the difference of cost of enrichment, as compared with oil, to *nil*, it appears to us that, as a matter of common justice and fair play as between the Corporation and you, the calculation as to the cost of enrichment by cannel should be based on the price of cannel and other conditions at the time when the agreement was entered into.

(Signed) THOS. NEWBIGGING AND SON.

A Warm Debate on the Question in the Town Council.

At the Meeting of the Town Council last Tuesday—the MAYOR (Alderman W. W. Wood) in the chair—the minutes submitted by the Gas and Electricity Supply Committee contained the following resolution: "That, after full trial of the apparatus and process patented by Dr. Dvorkovitz for the enrichment of gas by oil, and after careful consideration of reports by Mr. Lewis T. Wright, the expert called in to advise on the matter, the Committee find that the experiment has not proved a success to warrant the adoption of the system by the Corporation, and that the Council be accordingly recommended to abandon the scheme. The Committee, however, desire to acknowledge the kind services rendered by Mr. Isaac Smith in affording to the Corporation all possible assistance in the carrying out of the experiment."

The TOWN CLERK stated that he had received a copy of the report by Messrs. T. Newbigging and Son, dealing with Mr. Wright's second report to the Corporation.

It was decided that Messrs. Newbigging's report should be taken as read.

Mr. W. C. DIXON, the Chairman of the Committee, moved, and Mr. J. KAY seconded, the adoption of the minutes.

Alderman F. PRIESTMAN inquired whether the Chairman of the Committee would be willing to withdraw for one month that part of his resolution which discontinued the Dvorkovitz process, in order that the members of the Council might have an opportunity of acquainting themselves with the details of the scheme, which they had not yet had. He said he should also like to ask whether, if Mr. Dixon assented to this proposition, he would do it on the understanding that the Dvorkovitz process should be continued, in order that members of the Council, and others who were interested in the matter, could view it for themselves. It appeared to him the present was an exceedingly inopportune time to discuss the matter.

Mr. DIXON said it seemed to him that any time was a very inopportune one for dealing with this matter; but he was there to get at the bottom of it if possible. He had been connected with this business for a year and a half, and had had quite enough of it; and the members of the Council had had the same opportunity of going into the whole of the details. He was very sorry indeed that he was not able to recommend the Council to adopt the oil-gas process which had been experimentally in operation in the Corporation gas-works. The members would be aware that one of the crucial points during the whole of the controversy had been the value of the bye-products; and it appeared to him that there was no limit to the amount of exaggeration which was to be applied in the figures relating to this topic. Dr. Dvorkovitz had stated that he could enrich with one gallon of these bye-products 96,000 cubic feet of gas to the extent of 1-candle power. Mr. W. Wood, the Corporation Gas Engineer, gave as actual results of enrichment 77,000 cubic feet, 66,000 feet, and 50,000 feet enriched to the extent of 1-candle power with one gallon of the oil. From the experience he (Mr. Dixon) had gathered, and from the information he could get from any place in the kingdom, these results seemed to be very doubtful. In order to try to get to the bottom of the question, he himself took a sample of the bye-products, and sent it to be analyzed; and the result was they were stated to be absolutely worthless for carburetting. This was a staggerer to him; and the analysis was the groundwork of his action. He watched the results from time to time; and he at last induced the Committee to have an official test. They ordered the Engineer to get 2 gallons of the bye-products for the purpose; and the Deputy-Chairman and he (Mr. Dixon) went to the Thornton Road gas-works, and in their presence a sample was made up and sealed for analysis. In their presence, too, the sample was despatched to the analyst by messenger. He had the result of the analysis with him; and it thoroughly corroborated the first one. The remarkable part of the matter was that, although the Corporation Engineer did not know where he (Mr. Dixon) had sent his own sample to be analyzed, when he asked him where he would suggest that the one then taken should be sent, he responded that the best place was Messrs. Read Holliday and Sons, Limited, of Huddersfield. That was the very place to which he had sent his sample; and, as he had stated, the results of the two analyses agreed. After he had obtained the result of this second analysis, he saw Mr. Wood at Thornton Road. He told Mr. Wood that there was something radically wrong about the results which it was claimed were being realized by the system, and said, "Do not put your name behind any figures unless you are absolutely certain, because I shall bottom this business, if I have to sleep night and day with it after." The Gas Engineer apparently chose to take no notice of his advice, and results after results were presented to the Committee. They had the same kind of figures always coming, and making out the cost per candle of enrichment on the strength of what they were getting out of the bye-products. Members of the Council would remember that Dr. Dvorkovitz put a long report in the *Bradford Observer* in which he valued the bye-products at 1s. a gallon, and a paragraph in the *Bradford Argus* in which he said that these bye-products had ten times the enriching value of the oil itself. These reports going to the Committee as correct statements were calculated to make them believe that there was something in the process. But the results became less and less; and when they came to be put to the test, the Committee found that there was not one-tenth of a candle per gallon enrichment. In one test at Thornton Road, it was proved that there was not one-tenth of a candle per gallon, let alone the enriching of 96,000 cubic feet by a gallon. As a way out of the difficulty, when the position of the advocates of the Dvorkovitz system was "busted up" they made an offer to the Committee of 6d. per gallon. The Committee agreed to accept this; and the value of the process then rested upon the gas which it was making from the oil. The Committee agreed to accept 6d. before the last thirty-three days' test of the gas; and instructions were given to the Engineer to give Dr. Dvorkovitz and Messrs. Smith and Co. notice to get the bye-products out of the yard. But those bye-products were still in the yard; there were 40 tons of them at Thornton Road. It appeared to him at that time as if they were never going to get to the end of letters and statements upon the subject of this process. But the Committee at last came to the conclusion that, in order to bottom this question, they should appoint an expert; and this decision took a great load off his mind. Up to this point, he had been fighting this question, along with the Deputy-Chairman and others. But now it was decided to have an expert; and a Sub-Committee was appointed. They were instructed to write to Lord Kelvin and to the President of the Institution of Gas Engineers to ask those gentlemen separately to nominate three names of suitable experts. Neither of these gentlemen knew that the other had been written to; and each of them nominated three names. The result of their advice, as given in letters to the Sub-Committee, was that Mr. Lewis T. Wright was the highest authority in England on this particular question; and his name was more highly recommended than any other in England. The General Committee, therefore, had no alternative but to choose him. It was agreed that Messrs. Isaac Smith and Co., with Dr. Dvorkovitz, should superintend their plant; this being done in order to prevent any excuse to the effect that the test had not been carried out according to the instructions of the patentee. The time arrived for the test. He (Mr. Dixon) went up on the morning of the first day, and found at the gas-works, instead of Dr. Dvorkovitz and the Corporation expert being allowed to run the plant in their own way, according to the instructions of the Committee, there was a Mr. Shaw, who was one of the vendors, Dr. Dvorkovitz, and Mr. Newbigging (who was there without the authority or knowledge of the Committee), the two Corporation Engineers, and Mr. Sutcliffe, the Manager at the works. All these were on one side, with Mr. Wright alone in the interests of the Corporation. How Mr. Wright was to give a fair and impartial report with all these interested men around him, he (Mr. Dixon) could not see. But he did begin his work. He (Mr. Dixon) brought the question before the Committee of Mr. Isaac Smith having liberty to bring another expert without the knowledge of the Committee. This state of affairs, however, was allowed to go on. The second day of the test arrived. Mr. Wright came to him (Mr. Dixon) and said: "It is utterly impossible for me to give you an impartial verdict upon this business unless I have some assistance. I cannot watch all the parties. It is impossible for one man to do it; and I cannot take the responsibility of giving you a perfect test unless I have someone to assist me." He (Mr. Dixon) said he did not want to have anything to do with the matter of appointing an assistant, and would be glad if Mr. Wright would appoint one himself, as he had authority to do so. But Mr. Wright, being a stranger in Bradford, did not know anybody; and he (Mr. Dixon) had therefore himself to find some assistant. He asked the mechanic at his place if he knew a man who was out of work, and was referred to a Mr. Robinson, of Shipley. He sent for Mr. Robinson,

and gave him a note with which to go up to the gas-works and take his instructions from Mr. Wright alone. It appeared that the process had been going so badly against Dr. Dvorkovitz, and the Doctor had got into such a state of excitement, that, on the afternoon of the second day, he made the appearance of this assistant a pretext for stopping the whole plant and operations, turning off the retorts, and running away; and he had never heard from Dr. Dvorkovitz since. He put it to the members of the Council that if Mr. Isaac Smith had not been behind this apparatus, the scheme would not have been tolerated for another day. The Committee received a letter from Mr. Smith; and, in order to show there was not any partiality about the matter from beginning to end, they decided to meet him, and hear what he had to say, and what other offer he had to make. Mr. Smith's offer was for a fresh start to be made; and apparently nothing had been said about who was to bear the expenses. This business had cost the Corporation £170 up to the present time; and it appeared that they were not at the end of it yet. Mr. Smith came before the Committee and made another suggestion—that he should appoint Mr. Newbigging to look after his interests; Mr. Wright still remaining in the interests of the Corporation. A fresh supply of oil was obtained for the second test. It was understood, when the Committee allowed Mr. Smith to appoint Mr. Newbigging, that the Corporation had nothing to do with that gentleman's report, because he was obviously a paid servant of Mr. Smith, and that Mr. Smith would not expect that the Committee would be influenced in any way by any report which Mr. Newbigging might make; that gentleman's only purpose being to issue a report to Mr. Smith privately. When the second test was finished, and before Mr. Wright could get his report issued to the members of the Gas Committee, the report made by Mr. Newbigging was sent to every member. He thought no member of the Council would contend that this was a proper thing to do. He, for one, had a great respect for Mr. Isaac Smith, and had no personal animosity against him or anyone else in connection with this matter. He (Mr. Dixon) was acting fairly, and simply from honesty of motive in the matter. The *Bradford Observer* had made a disgraceful charge against him, of having had an interview with Mr. Wright before that gentleman was appointed. He claimed that that amounted to libel. Prior to his appointment, he never had any correspondence with him in any shape or form. The report of Mr. Wright, which was issued to the Committee, showed that the cost of enrichment was 0·76d., and that the value of the bye-products was 1·71d. These were the bye-products which had been conjured with all this time, and for which it was claimed that they would enrich 96,000 cubic feet to the extent of 1-candle power per gallon, which the promoters of the system pretended to offer the Corporation 6d. a gallon for, and which were stored at Thornton Road. The result of Mr. Wright's first test, which was carried out in the presence of Mr. Newbigging, the Corporation Gas Engineer, Dr. Dvorkovitz, and all those who were interested in the process, was that 39½ gallons of bye-products enriched 88,000 cubic feet of gas to the extent of 0·66 candle. Was this good enough for the Corporation of Bradford? He claimed that the figures that were put forward by the advocates of the process had been exaggerated from beginning to end; and he was sorry that their Engineers had put their names behind such figures as had been issued. He had cautioned them before they did it; and he had offered at a Committee meeting (before any expert was called in), £100 to charities if they could divide their figures by ten and then be anywhere near right. After that test, those who were in favour of the process—Mr. Newbigging, the Corporation Engineers, and Dr. Dvorkovitz—suggested that there should be another trial with the carburetter; and the trial on July 26 was taken entirely at the instance of those interested in the system. The result was also unfavourable. He proceeded to call the attention of the Council to important differences in the reports of Mr. Wright and Mr. Newbigging. Mr. Wright took the price of the oil at 3·8d. per gallon; and Mr. Newbigging's price was 3¼d. per gallon. Now, Mr. Wright did not take the price of the oil as it might be purchased in small quantities; but he asked the Town Clerk to write to the people who had the oil to sell, and ask for the price for large quantities. In reply, Messrs. Besseler and Co. wrote that, if they received an order promptly, they could let the Corporation have a few hundred tons of a cargo of Noble Brothers' Solar oil distillate at the price of £4 per ton net cash delivered, though they could not in the present state of the market make a very extended contract at this price. Prior to this, the Gas Engineer had written to this firm to ask the price of this oil; and they, having an exaggerated idea of the quantity required at Bradford—they supposed the requirement of the Corporation would be about 4000 tons per annum—quoted 3⅞d. per gallon net cash delivered. These were the bases on which Mr. Wright had fixed his price, and upon which he made his calculations. Mr. Newbigging's price of 3¼d. per gallon, no doubt, applied to some other kind of oil—used in different places and under altogether different circumstances—to the Russian oil which must be used to enable the Dvorkovitz apparatus to work, and without which it would not work at all. He thought he had shown them that Mr. Wright's price was the correct one. Returning to the question of the bye-products, he said he had referred to the sending away of samples for analysis. After these samples had been dealt with, Mr. Newbigging sent away some samples; but, instead of sending them to the eminent firm of Messrs. Read Holliday and Sons, he submitted his samples to a less-known firm, who had given the process the benefit of an analysis of the oil when separated. Anything more ridiculous than this proceeding, he had never seen in his life. The chemist, taking the analysis in this way, made out the value of the bye-products to be 4⅛d., as against 1·71d., which was proved to be the correct figure. Another point which he had to deal with was the question of expense. It had been generally understood all through the experiments that they had been conducted at the expense of Mr. Isaac Smith. He thought it was high time that the ratepayers of Bradford knew that they had not been carried out in that way. He had a copy of the minutes of the meeting at which the matter had been determined. This showed that the understanding was that Mr. Smith was to bear the whole expense, and find pipes and fittings. If there were to be any alterations, these were to be carried out at the cost of Mr. Smith; and in the event of the experiment not being successful, the apparatus was to be taken away by that gentleman. The ratepayers ought to know what had actually been done. The Corporation were in the remarkable position that, without the consent of the Chairman of the Committee, or the body of the Committee knowing anything about it, they had gone to work and spent hundreds of pounds in developing somebody else's patent; and he did not think that a proceeding of this sort would stand the light. Certainly, Mr. Smith had put down retorts and furnaces, two scrubbers and an exhauster, and a water-gas plant which had never been used; but the Corporation had put down four large condensers, 14 ft. high by 2 ft. in diameter, one carburetter, one engine at Thornton Road, which had been rearranged and altered half-a-dozen times, one engine at Mill Street, another carburetter at Mill Street, one square tank 4 ft. by 4 ft. by 6 ft., one boiler 18 ft. by 6 ft., two boilers 25 ft. by 7 ft. 6 in., two large meters, and all the small piping up to 2 inches, besides all the expense of alterations. He wished to know how it was possible that the officials at the Town Hall could take such liberties as these, when there was not a soul who knew that the Corporation money was going in this way. The Committee had tried every possible way with this system, and could not get along any longer with it. Now the Committee were driven into a corner, they were determined to expose the whole thing.

Alderman Moulson, a former Chairman of the Gas Committee, remarked that, notwithstanding all the statements made by the present Chairman of the Committee, he thought that the matter had been as much exaggerated that afternoon as ever it had been in the past. [Mr. Dixon: Prove it.] One member had said that, whether the process was successful or not, it would be rejected. It was well known by the Committee that, when Mr. Shaw appeared to try to make arrangements for the scheme to be tested, the promise was made that, if it was a success and was a saving to the town, the plant would be taken over by the Corporation at a valuation by their Engineer. If the Council rejected the scheme under present circumstances, they would be doing very wrong, because he held that it had been given in, both by Mr. Wright and Mr. Newbigging as well as by the Corporation Engineers, that it was a success. Putting it in the very worst way he could, Mr. Wright admitted a saving of £942, and said he had no doubt that the use of oil would show an economy over cannel coal as material for enrichment. Then Mr. Wright, in finishing his report, added that, during the tests, both Mr. Charles Wood and Mr. Sutcliffe, the Superintendent of the Thornton Road works, spared no pains in helping him in the inquiry. This did not look as if Mr. Wright had received so much opposition from these two gentlemen. Mr. Wright showed the process yielded a saving of £942; whereas Mr. Smith said it would be a saving of £1400 at Thornton Road only, and £6000 for the whole of the works. He was of opinion that Mr. Isaac Smith's last offer should be accepted; and he moved, as an amendment, that the minutes be adopted with the exception of that portion relating to the abandonment of the Dvorkovitz process, and that the Council accept Mr. Smith's offer in connection with the same.

Mr. J. S. Toothill, in seconding the amendment, said that Mr. Dixon had stated that a sample of the bye-product was sent to Messrs. Read Holliday and Sons, who replied that it was worthless. He (Mr. Toothill) had a memorandum from the firm in which they said that 20 per cent. of the bye-product would be worth 1s. a gallon.

Mr. Dixon: I said that they replied that it was absolutely worthless for carburetting.

Mr. Toothill said that, in the memorandum, they stated that they knew nothing about carburetting; but that both the benzol and the naphtha could be used for carburetting purposes. He did not see why Mr. Dixon should feel so hurt that Mr. Newbigging was present at the trials. The inventor had a good deal at stake; and it was only fair that both sides should be represented. The majority of the Gas Committee had come to a decision, but one which he did not think was in accordance with the evidence produced. There had been several tests; and all, without exception, had shown that the process was capable of effecting considerable economy in gas enrichment. The present proposal of Mr. Smith was as follows: That on the Corporation agreeing to work the plant at Thornton Road for six months continuously, and to utilize the bye-products for the same length of time, under directions to be supplied by him, he would allow £150 to be expended upon additional plant for treating the bye-products, and guarantee, moreover, that the cost of enrichment should not then exceed ¼d. per candle for every 1000 cubic feet of gas supplied for consumption. Should the cost of enrichment not exceed this figure, then the Corporation should take over the plant at the end of the six months at cost price. This was altogether a one-sided bargain; and the advantage was entirely on the side of the Corporation. The experiment was to be carried on without risk or expense, and promised to enrich the gas at a saving of 50 per cent.; and the economy thus effected would realize over £6000 a year on a capital outlay of about £2000. The length of time proposed for the experiment was very important, and would settle the controversy once and for all. During the early part of the present year, a 33 days' test was made by the Corporation Engineer, with the result that an enrichment per candle-thousand was obtained at a cost of 0·42d. These figures were arrived at by valuing the bye-products at 6d. per gallon; but if the value was taken at 4d. per gallon, then the cost of enrichment would be ¼d. per candle thousand. Now the bye-product had been a cause of considerable difficulty in the Committee. It was the remains of the oil after having passed through the retorts, and consisted of benzol, naphtha, and other substances of commercial value. Several analyses had been made, but with varying results. One test had been made by Mr. John Craven, chemist to Messrs. Hardman and Holden, tar distillers, of Newton Heath, near Manchester. The reputation of this firm was well known. The result of the test was stated to be that out of 100 parts there were 23 per cent. of benzol, 12·5 per cent. of naphtha, 40 per cent. of heavy oils, and 24·5 per cent. of pitch, the commercial value of which was between 4d. and 5d. per gallon. The tests were not sufficiently conclusive for several members of the Committee, one of whom communicated with Mr. Lewis T. Wright, who stated that Mr. Wood's calculation as to the cost of enrichment was wrong, and should have been multiplied by five. Thus, instead of the cost being 0·42d. it should be 2·1d. This was a most mysterious statement for a gas expert to make; and it had cost the members of the Committee a serious amount of trouble. Was it

misrepresentation, or was it ignorance? Mr. Wright came before the Committee, and was questioned as to the accuracy of his statement; and with reluctance he admitted that Mr. Wood was right, and that he was wrong. But he offered neither explanation nor apology. Yet this gentleman, out of eight or nine distinguished names, was chosen as the Corporation's expert. With reference to the appointment of this expert, he had always been of opinion that no expert was needed. Their own Engineers were quite capable of carrying out any tests of this description; but others thought differently. When the idea of appointing an expert came before the Committee, it was resolved to write to Lord Kelvin and Mr. Charles Hawksley, asking them to suggest suitable names for the appointment. Now, a local paper had recently stated that Mr. Lewis T. Wright had been recommended by Lord Kelvin and Mr. C. C. Carpenter, the President of the Institution of Gas Engineers. Lord Kelvin only gave one name, and that was Dr. John Hopkinson; Mr. Charles Hawksley recommended five, but Mr. Wright was not one; and Mr. C. C. Carpenter three, of whom Mr. Wright was the last, with a few friendly words of recommendation. As a "gas expert," Mr. Wright was a mere baby in experience; he having only been in practice about twelve months. Previous to this, he was a Gas Manager in South America. Reverting to the tests, Mr. Toothill said that the last were made a few weeks ago, with Mr. Wright acting ostensibly on behalf of the Corporation, and Mr. Newbigging, on behalf of Mr. Smith. The tests were for one-and-a-half days; and Mr. Newbigging stated that, generally, his results were very similar to those of Mr. Wood—the cost per candle enrichment per 1000 cubic feet being about one-third of a penny—0·367d.—that was, taking the bye-products at 4¾d. per gallon. Mr. Wright also submitted his report, the ramifications of which he (the speaker) defied the ordinary lay mind to follow. His findings were that the cost of enrichment by oil gas was 0·76d. per candle per 1000 cubic feet; and the value of the bye-products was 1·71d. He also stated that the adoption of the process would effect a saving of £940 a year. To summarize: On the one hand, they had the two tests by their own Engineers, the evidence of Mr. Newbigging, and the claims and evidence of the patentee (Dr. Dvorkovitz), with Mr. Smith and Mr. Shaw as promoters. These, one and all, asserted that a saving of 50 per cent. might be realized by the enrichment of gas by this process, or a gross saving of above £6000 a year to the Corporation. On the other hand, they had the solitary figure of Mr. Lewis T. Wright, who ran up the cost of enrichment on the one hand, and ran down the value of the bye-products on the other, but whose statements would not bear sifting. Mr. Wright assumed a very serious position in giving the direct lie to every other man who had had to do with the process. The appointment of this expert had cost the Corporation about £200; and the sole result had been entanglement and bewilderment. The only way out of the present awkward and unpleasant position was to accept the offer of Mr. Smith, and give the scheme a fair and uninterrupted trial of six months. If the plant had been allowed to work since its erection, it would by this time have entirely cleared its cost.

Mr. W. Land supported the original motion. He said he was a member of the Sub-Committee appointed in connection with the process; and at the first meeting, after a brief reference to the Dvorkovitz system, the Chairman proposed to put a resolution authorizing the Committee to spend £500 in experimenting on the process. He happened to know something of a process with which Dr. Dvorkovitz had been connected, and which had been tried by another Corporation; and he strongly objected to the £500 being spent on the particular process. He believed then, as he did now, that it was the duty of the inventor and the gentlemen connected with him to have perfected their invention, and not asked the Council to spend public money in doing it for them.

Mr. T. Speight also supported the original motion. He said he would take up the aspersions on the character of Mr. Wright. He had letters at home from the Mayor and Aldermen of Nottingham speaking of Mr. Lewis T. Wright when he was their Engineer, and of how the Corporation offered to present him with £2000 to £3000 in appreciation of his services when he left them. Mr. Toothill had said that Mr. Wright had been in Buenos Ayres. He had there a salary of £3000 a year, which they were not likely to give to a numskull. Mr. Toothill also said that Mr. Wright had had to admit before the Committee that Mr. Wood's figures were correct. Now, in the presence of Mr. Wood and of the whole Committee, he (Mr. Speight) asked Mr. Wright if he had anything to withdraw or contradict in the statements he made on the question of this division of five. He said: "I have nothing to withdraw; but allow me to explain. If you take this paragraph, literally, as it was presented to the Committee, Mr. Wood is five times wrong; but to let Mr. Wood down gently, I am willing to believe that Mr. Wood did not intend to convey the impression he did convey."

Mr. Toothill: Mr. Wright withdrew the whole thing before the Committee.

Mr. Speight proceeded to say that on Feb. 27 Dr. Dvorkovitz told the Committee that the oil-gas enrichment would cost 0·33d.; but Mr. Wood informed them that the cost was 0·25d. per 1000 cubic feet for 1-candle power. Again, on Feb. 27, Dr. Dvorkovitz informed them that, if they adopted this system, they could save £11,279 a year. How did he get at this? In every case he took the cannel coal at 16s. per ton, when the cost was only 13s., and calculated the oil at less than cost; and he, like Mr. Wood, put the illuminating power at 111 candles, while Mr. Newbigging placed it at 82 candles. The £11,279 had dwindled down to £7300, and finally to £6000. Why should this be so? If the figures of Feb. 27 and in March were true, why did not they stand to them? Then they were told again by Mr. Wood that one gallon of the bye-products had enriched 66,000 cubic feet of gas; and afterwards he reported that he had taken some of the bye-products down to Valley Road, and there they had only enriched 40,000 cubic feet. Mr. Wright stated that it took 39·5 gallons to enrich 88,000 cubic feet of gas 0·66 candle. On March 28 Mr. Wood said in his report that, if they enriched the whole of the gas made at Thornton Road, which amounted to 3,500,000 cubic feet, by this oil gas, they would have a saving of £950 per annum. On April 1, which was only three days later, and quoting the same figures as Mr. Wood, Dr. Dvorkovitz said that, if they enriched the gas by his process, the profit would be £2396. How could anyone possibly reconcile such discrepancies as these? Mr. Wood had acted in such a way that he had begun to wonder whether he was the servant of the Corporation or the servant of Dvorkovitz and Co. He could not yet make out whose interests Mr. Wood was trying to serve. He placed more reliance upon Mr. Wright's figures than upon those of either Mr. Wood or Mr. Newbigging; and he would urge that so small a saving as £952 per annum was not sufficient to warrant them continuing a process of this kind.

Mr. W. E. Ackroyd thought that there was a probability that in the near future a system would be found by which gas could be enriched without any trouble at all as regards bye-products; and therefore it would be better for the Corporation not to commit itself to any particular system. He had been rather puzzled to understand why such apparently generous offers were being made by the Dvorkovitz Syndicate until he read an article in the *Bradford Observer*, in which it was stated that it was pretty well understood that the Syndicate expected to reap their reward, in the event of the success of the Bradford experiment, from the general adoption of the process opening out a new market for oil.

Alderman F. Priestman supported the amendment. He thought that the course recommended by the Committee would be a serious injury to the interests of the ratepayers, and would be a gross injustice to Dr. Dvorkovitz. He did not believe there was a member of the Council who knew anything whatever about the question of gas enrichment who would not readily admit that, in the future, oil gas had a very important part to play in the enrichment of coal gas for illuminating purposes. If there were any who did, he would call their attention to a paragraph in Mr. Wright's supplementary report, in which he said: "But for the introduction of oil-gas processes in their various forms, in view of the foreign demand for the cannels of this country, it is not too much to say that there would be a very great scarcity of this article, with consequent high prices." If there were no other argument in the report, this ought to be sufficient to induce every member of the Council to pause before denouncing the oil-gas process as a failure. Another reason for referring the matter back to the Committee, with instructions to make the best terms they could with Mr. Smith, was the statement that for some reason Mr. Smith had not paid for the apparatus as he promised to do. He knew that Mr. Smith was an honourable gentleman; and that, after terms had been made with him, he would pay every farthing which he had promised to pay. By referring the matter back, the Committee would have an opportunity, by making terms with Mr. Smith for six months, to recoup themselves. He thought the wise course would be to work the process at the Thornton Road gas-works for six or twelve months, and if there was any rival process that could be tried on equally favourable terms, to test it at some other works. Then in a very short time the Committee would be able to recommend one of the processes for adoption. But the main argument in favour of the course he had advocated was that, if the process were rejected, a pæan of rejoicing would be raised among producers of cannel coal, who would immediately endeavour to raise prices, with the result that, instead of saving £1000 or £6000, as the case might be, by the adoption of the one or the other of the oil-gas processes, the Corporation would probably have to pay £5000 or £6000 more a year for cannel coal.

Mr. Robinson said he thought the Council had had enough for the time being of the oxy-oil and other gases, and suggested that the Chairman should give an assurance that no other process should be brought before the Council for some time, and that, when any other process was considered, that of Mr. Smith should receive consideration.

Aldermen Hill and Edhouse were in favour of further experiments with the process.

Alderman Bottomley thought it would be in the interests of the Committee themselves that the resolution should be withdrawn.

The Mayor here read the amendment, which approved the minutes of the Committee, with the exception of the resolution recommending the abandonment of the oil-gas process, and accepted the offer of Mr. Isaac Smith made on the 4th inst., subject to terms to be specified in an agreement to be prepared by the Town Clerk for carrying the same into effect.

It was pointed out that the discussion had not taken place on the amendment as just read; and

Mr. Toothill repudiated the amendment in the terms in which it originally stood.

The Mayor ultimately ruled the amendment in the altered terms out of order; and the amendment was restored to its original form, approving the minutes except that relating to the oil-gas question, expressing the opinion that further information was required before any conclusion was come to, and referring the whole subject to the Committee for further investigation.

Mr. Crossland seconded the amendment in this form.

Mr. Dixon, in his reply, said the discussion had been mainly on side issues. This process was behind others to the extent of 10,000 feet per ton, or 12½ per cent. It was absolutely the worst known; and he maintained that the Company wanted to force a plant on to the Corporation for the distillation of bye-products.

On the amendment being put, it was carried by 23 votes to 22.

At Friday's meeting of the Gas Committee—Mr. Dixon in the chair—a resolution was moved that permission be given for the fires to be lighted in connection with the oil-gas apparatus at the Thornton Road Gas-Works, in order that two gentlemen who had come from Paris on the invitation of Dr. Dvorkovitz, might see the process in operation. By a small majority, it was decided to refuse the permission. No further action was taken in regard to the oil-gas question; and it is not contemplated, says the *Bradford Observer*, that the Committee will make any attempt at further investigation during the present month.

Plympton and the Water Supply of Plymstock.—The Plympton District Council have had submitted to them a report on a proposed scheme of water supply for Plymstock. It provides for a reservoir of a capacity of 100,000 gallons and 7500 yards of distributing-pipes; the total cost of the undertaking being estimated at £5119. The report is to be considered at a joint meeting of the Plympton Water Committee and representatives of Plymstock.

SHEFFIELD UNITED GASLIGHT COMPANY.

The Half-Yearly Meeting of this Company was held last Tuesday, at the Cutlers' Hall—Sir F. T. MAPPIN, Bart, M.P., in the chair.

After the usual preliminary business,

The CHAIRMAN, moving the adoption of the report [see *ante*, p. 447], said that during the half year they had spent £10,915 upon capital account. Nearly the whole of this sum had been upon the new gas-works at Grimesthorpe, which they were proceeding with gradually. The demand upon the Company last half year for gas had equalled 955,000,000 cubic feet, compared with 878,000,000 cubic feet in the corresponding half of 1894—being an increase of 76,000,000 cubic feet, or 8·72 per cent. This large increase assured them they were doing right in proceeding gradually with the works at Grimesthorpe. The leakage had been 46,894,000 cubic feet, equalling 4·68 per cent. of the make; and last year it was 54,789,000 cubic feet, equalling 5·86 per cent. This was a satisfactory decrease; and he hoped the leakage might be further reduced, though he was told not to be too sanguine on this score. The revenue account showed a profit of £40,987; and after paying in dividend £38,262, they had a balance of £2390 to carry over to the current half year. The proprietors would remember that the corresponding half of 1894 showed a large balance—£17,018, which was carried to the reserve fund. But they must bear in mind the Company were then charging 3d. per 1000 cubic feet more than during the past half year. As soon as the Directors found they had this large balance to their credit, they did not hesitate to reduce the price of gas to the lowest point at which they had hitherto been able to sell it. Although they had sold 76,000,000 cubic feet more gas, they had received less money for it by £2826. If the gas had been charged as last year, the receipts would have been £11,943 more. The residuals had been disappointing, as they had been with other companies; for it was only natural, as they bought their coal for less, they should obtain less for their coke. This had been the case to the extent of £3883. Sulphate of ammonia had produced £4170 less. He was often surprised that this valuable commodity was not more used in England. No doubt, agriculturists had much to learn, not only about manures, but about other things. Coals had cost £1037 more; but for this money they had obtained 6398 tons more to produce the gas they sold. Stokers' wages had been increased by £1349; and repairs to works and special items had cost £2676 more. They were making great alterations in their plant for the manufacture of gas; and the Board and their Managers were satisfied that the money which had been liberally spent had been well spent. They had received £1881 more for tar, which was the only item which showed an increase over last year. The reserve fund was now in a very satisfactory state; being at its maximum—£86,192. The working of gas companies was very erratic; and he found, on going through the accounts, that the total they had received for residuals per ton of coals was 7s. 4¾d. for the six months, against 9s. 3¼d. in 1894. This was an item they had no control over. They had to accept a fair market price; and he thought he would be able to show them they had done that very well. "Field's Analysis" for 1894 showed a result with which he thought they had occasion to be gratified; for, after paying for their coals, the residuals left them £924 to the good. They were the only gas company in England who could show anything to their credit after paying for their coals. Mr. Field gave a return, comprising 11 Provincial gas companies, 9 Corporation gas undertakings, 3 London gas companies, and 12 London suburban gas companies; and, as he had said before, the Sheffield Company was the only one whose residuals paid more than the coals cost. The good management in this respect must be apparent to all; and it was satisfactory and beneficial, not only to the shareholders, but to the consumers, who all profited by a company like theirs being worked to the best advantage. During the six months they had made 1150 tests; and the illuminating power of the gas had averaged 17·86 candles, as against 17·92 candles last year. The number of meters they had fixed, after deducting nine 2-light and one 40-light meter less than they had last year, showed that during the twelve months they had 613 more meters at work than in June, 1894—varying from 3 up to 300 lights per meter. They had also fixed 68 additional cooking-stoves during the half year; and the total number now in use was 1768. There had been no demand for automatic prepayment or "penny-in-the-slot" meters. As he had stated on former occasions, the number of their consumers was larger in proportion to their capital than in almost any town in England. They had 48,000 consumers, with a capital of £796,000. Birmingham had 58,000, with a capital of £2,325,000; Liverpool, 72,000, with a capital of £1,859,000; and Manchester, 81,637, with a capital of £1,554,000. It would, therefore, be seen that the working classes of Sheffield had taken advantage of the gas the Company had supplied more than the people of any other town in England; and they evidently appreciated the quality and price of the article they had been able to obtain. From Jan. 1 of this year down to June 30, 20 additional gas-engines had been fixed—equalling 103¾-horse power; and the total number of gas-engines now fixed in Sheffield was 427. This number would doubtless increase, as they occupied little space, and were always ready when their work was required. He noticed that the Chairman of the Great Eastern Railway Company, Lord Claud Hamilton, complained of a falling-off of £36,000 in the coal traffic during the last half year. He attributed this to the coal strike, and to the fact that the people in the district served largely by his Company had substituted gas-fires for the open coal-grates; and he calculated that the Great Eastern Railway Company had carried 90,000 tons less of coal than previously, principally on account of the great increase of gas-fires. Speaking for himself, he (Sir F. Mappin) did not know anything that was a greater luxury than a gas-fire in a bedroom in the winter time. The Chairman of the Incandescent Gas Company, at a meeting of that Company in July, spoke in glowing terms of the progress of their system of street-lighting; and he said he did not believe they had yet touched the fringe of the business that was before gas companies, on account of the great advantage that their mode of lighting was giving to them. At The Gaslight and Coke Company's last meeting, Mr. Frazer, speaking of the lighting of an embankment at Brighton with the incandescent gas light, said it was so satisfactory that the whole of it was going to be lighted on the system. On a previous occasion he had given his opinion of the incandescent gas-burner; and they could not be surprised at the great progress it had made, when they considered that in place of the usual burners, they could have one that gave so much more light at half the cost, and with so much less heat. The development of the Incandescent Company's business had been so remarkable that their turn-over was now fifteen times larger than it was two years ago. Its profit last year was £90,000. Of this sum £20,000 went to the Managing Director and the Chemist; leaving the Company a profit of £70,000. There must be a great deal in the new burner; otherwise the Company would not have achieved such a remarkable success. No doubt, the prosperity would not be continued; for numerous law-suits were pending, to test the question whether the patents of the Company were as substantial as was supposed, and protected the Company to the extent they had hitherto done. His own opinion was that the gas industry in a very short time would be in possession of burners, costing 1s. each, that would place gas in a totally different position to that it had occupied in the past; and that the rivals of gas would have to face the incandescent burner. It was a subject that would require consideration, not only by gas companies, but by those who produced a light in opposition to gas. He was a firm believer in the prospects of gas companies that were well managed, that produced a good article, and sold it at a fair and reasonable price. He had not lost his faith in gas, or in the Sheffield Gas Company. He was satisfied the Company had before it a great future.

Mr. EBENEZER HALL seconded the motion.

Mr. JOHN WILSON suggested that the Company might take 2d. off the price of gas, and "knock out" the electric light. He thought there was a possibility of the electric light reaching them in time; but if they gave people gas at 2s. per 1000 cubic feet, it would keep the new light back.

The CHAIRMAN reminded the meeting that, to adopt Mr. Wilson's suggestion, would make a difference of £15,000 a year to the Company; and having regard to the great changes which occurred in the values of residuals, he thought they ought to be very careful how they interfered with the price. A balance of £2000 did not justify them in sacrificing £15,000 a year. He could not, therefore, hold out the prospect of gas being reduced in price at present.

The motion was then put and adopted; and, on the motion of the CHAIRMAN, seconded by Mr. H. HUTCHINSON, the usual dividends were declared.

Mr. CHARLES BELK proposed the re-election of Sir Frederick Mappin as a Director of the Company. He said the shareholders had a Board of Directors with whom they were well satisfied; and so long as they continued the "sweet simplicity" of the 10 per cent., they would all, at these half-yearly meetings, be a happy and united family. Sir Frederick Mappin had long been associated with the Company; and to him its success was largely attributable. He (Mr. Belk) thought the report was an exceedingly business-like and satisfactory one. During the last half year there had been no periodic scares in connection with electric light—got up perhaps for Stock Exchange purposes, and to depreciate gas shares. There was no doubt the electric light had a future before it as an illuminant; but he did not think there was the slightest probability that, in this generation, it would supersede gas. With such inventions as that to which Sir Frederick Mappin had referred, he did not think they need have the slightest fear as to the success of their property.

Mr. J. B. WOSTINHOLM seconded the resolution, which was carried.

Mr. Henry Hutchinson and Dr. Sorby were also re-elected Directors; and votes of thanks to the Directors and officials, and to the Chairman, terminated the meeting.

HERTFORD GAS COMPANY.

Loss of the Company's Account Books.

At the Annual Meeting of the Hertford Gas Company last month—Mr. E. MANSER in the chair—the circumstances leading up to the recent changes in management were detailed in a lengthy report by the Board, of which the following are the principal parts:—

The history of the Company during the past year has included certain events of so extraordinary a nature that the Directors consider it their duty to lay them before the shareholders in a fuller manner than is usual under ordinary circumstances.

About the end of December last, the Board thought the arrears of gas-rent were unduly heavy; and that, for that and other reasons, it was desirable to obtain the advice of an expert. They therefore engaged Mr. Alfred Lass, F.C.A., a London Accountant having specially wide experience and knowledge of the affairs of gas companies, to come down to Hertford, inspect the Company's books, and advise the Board upon them. On Jan. 1 Mr. Lass came down, and made a careful inspection of the books, in conjunction with the Chairman and some of the Directors. Mr. Lass expressed the opinion, after a long examination, that the collection of gas-rents was very bad; that the arrears were very large; and that the Company's accounts were very unsatisfactory. He also advised the adoption of a new system of book-keeping and the opening of fresh books. Mr. R. W. Brett, the then Manager, and Mr. R. W. Brett, jun., his son, the then Collector, were present at that conversation.

After the interview, Mr. Lass had a private conference with the Chairman, and advised him to have the rental and other accounts made up to the 31st of December as early as possible; but, before sending them out, to get them examined by the Company's Auditors, to see that they agreed with the Company's books, and then to send them direct to the consumers.

Accordingly, the Chairman instructed Mr. Brett to get the rental and fittings books made up, and to inform him when they would be ready. About the 12th of January, Mr. Brett stated they would be ready in a few days; and the Chairman then instructed him not to send out any accounts, as the Directors wished them examined and checked with the books before delivery. After that interview, Mr. Brett informed the Chairman that he and his son would complete the balancing on the 15th of January; and the Chairman desired him to have the books at the Company's office on the 16th, and arranged with the Auditors to check the accounts with the books on that day and the next if necessary.

On the 15th of January, the most important books of the Company disappeared—viz., the rental-book, the cash-book, two ledgers, and the fittings accounts.

On the evening of the 15th of January Mr. R. W. Brett, jun., came to the Chairman's house about nine o'clock, and made the following statement—namely, that he packed the books up on the evening of the 14th, and left them in the office of the Company in Castle Street, Hertford, in the place where parcels were usually left which had to go down to the works; that he had then gone out with his wife for the evening; that the next morning, when he met his father near the town, he asked him if he had received the books, and was told he had not, and said he would go back and look after them. It does not appear that he did anything that morning; but he informed the Chairman that about three o'clock he went to the works and found no books had arrived, and about six o'clock he went to the Police Station to report the loss. No information, however, has been obtained throwing any further light upon the circumstances of the disappearance.

The Directors met on the morning of the 16th, and examined all the inmates of the house; but it appeared no one had seen the books, or received any instructions to take them to the works.

Acting under the advice of the Company's Solicitor (Mr. T. J. Sworder), notice was given to Mr. R. W. Brett and his son to make up their accounts, and deliver up all books, papers, and documents to him; and notice was also given to Mr. R. W. Brett, jun., to leave the house. On the 21st of January Mr. R. W. Brett, sen., was asked if he wished to resign. After requesting seven days to consider his position, he refused to do so; and three months' notice was therefore given to him to leave the Company's employ, and he has accordingly ceased to be Manager of the Company's works.

Both Mr. R. W. Brett, sen., and Mr. R. W. Brett, jun., protest that they are not responsible for the loss of the books, and adhere to the allegation that they have been stolen. The Directors, with the assistance of Mr. Alfred Lass, and information given by Mr. R. W. Brett and his son, and obtained from the remaining books, and by communication with the consumers, made up and collected the gas-rental accounts to the 31st of December, and have now prepared the best statement possible of the present position of the Company. The accounts prepared under Mr. Lass's superintendence, up to the 30th of June, 1895, will be laid before the shareholders. They show that, upon comparison of the present position of the Company with that shown on the last balance-sheet (June 30, 1894), it appears there is a deficiency of about £1800 in the assets and money of the Company.

Under these circumstances, the Directors cannot recommend any dividend; but as it is necessary to raise money to meet the liabilities, they recommend the only course open—viz., to raise additional capital. For this purpose a resolution will be submitted to the proprietors at the special general meeting which will be held at the close of the ordinary meeting, authorizing the issue by the Directors of £3000, the remainder of the sum of £6000, first part of the additional capital authorized by the Act of 1864. The Board propose to issue only so much of this capital as may be needed to place the affairs of the Company on a sound and satisfactory basis.

The Directors have appointed Mr. Robert Watson as Manager of the Company, in place of Mr. R. W. Brett. They have also appointed Mr. Watson as Secretary of the Company, and recommend that a salary of £40 per annum be paid to him for his services as Secretary. They have also appointed Mr. John N. Tomes, as Collector, in place of Mr. Brett, jun.

They believe that the business of the Company is thoroughly sound, and that there is no reason to doubt that under capable management, which the Directors believe they have secured, the prosperity of the Company—which has for a course of over 30 years paid remunerative dividends—will be renewed. They therefore trust that the policy they have recommended may receive the support of the shareholders.

The Directors propose that in future the accounts of the Company shall be under the supervision of Messrs. Alfred Lass, Wood, and Co., Chartered Accountants, of No. 30, Gracechurch Street, London.

The report having been taken as read,

The CHAIRMAN called on Mr. Lass for the financial statement.

Mr. LASS said he would endeavour to lay before the meeting, in as clear and lucid a manner as possible, the statement of accounts of the Company for the past year. Before directing his attention particularly to those accounts, he should have to say a word or two with reference to the accounts which were published for the year ending June 30, 1894. There were three or four items in that year's balance-sheet which he should like to submit to their notice. In the first place, the amount owing to sundry persons was there shown as £1673. In making up this year's accounts, it had been discovered that the amount which was owing to sundry persons on June 30, 1894, instead of being £1673, as placed on the balance-sheet, was £2172, so that there was a sum of £499 additional liability should have been included in the accounts of that time. The next item to which he wished to refer was the amount owing to consumers for deposits and interest, £40 odd. As far as he had been able to ascertain, that amount ought to have been £59. Therefore the liabilities of the Company in that direction were understated in the balance-sheet for last year by £19. The next item was the amount owing by sundry persons to the Company for rental and repairs, which came to £2400; taking rentals alone, the sum of £1497. Now the rental-book, which contained the names of the consumers and the sum owing by them, having with the Company's cash-book disappeared, it became necessary to construct from the best available source a new rental-book. The result had been that of the sum of £1497, which appeared to be owing to the Company on June 30, 1894, a sum of only £1090 could be traced; the difference against the Company being £406. The sum of £902 was shown, on June 30, as owing to the Company from sundry persons for residuals sold and for gas-fittings. The ledger containing the names of the persons owing this amount having disappeared, and no list having been discovered among the Company's papers, the result had been that of the sum mentioned they had only been able to discover the amount of £281; the difference against the Company being £620. In last year's balance-sheet there also appeared to be owing by the collector the sum of £42. The difference between the amount which appeared to have been received by the collector from the 1st of July, 1894, down to the 30th of June, 1895, and the amounts which had been paid into the bank amounted altogether to the sum of £166. The total of the various differences he had mentioned was £1713 against the Company, which with £100 which had been added to meet contingencies, came to £1813, which the Company would have to pay off out of future profits. He now came more particularly to the accounts for the past year; and he thought that, instead of reading them through, it would be better that he should explain them, in order that the proprietors might better understand how the working for the past year had turned out. First of all there was the capital account, out of which they had expended £58 in the laying of new mains. Upon new meters, they had spent £18; and the Directors had bought certain fixtures in the house of the late Manager for £20, which made a total expenditure of £96. The amount expended on capital account to June, 1894, came to £15,841; so that the present capital account showed a total expenditure of £15,938. As the total capital raised was £15,990, there was a balance on that account of £51 odd. Next they had the revenue account. For the past year, the amount received from private and public lighting came to £4856; rental of meters, £95; residual products, £689; and transfer fees, 7s. 6d.—the gross receipts of the Company being £5641. Out of this sum they had had to pay for coals, purifying, salaries of managers and officers, and wages and other general expenses, which came to £5446; leaving on the face of it a profit on the year's working of only £194. He would like to give a few calculations with reference to the working for the past year, as there were several points of great interest which he thought should be laid before them, as they would then be able to form some opinion as to whether the undertaking was going to show a profit or a loss in the future. Gas undertakings, as a rule, if managed properly, earned a sufficient amount of profit to enable a dividend to be paid on the capital invested. They found at Hertford there was only a profit of £194 for the past year; and he should be able to give a few facts which he thought spoke for themselves. They had only sold 86½ per cent. of the gas made. The gas used at the works amounted to 2 per cent.; while the leakage was 11½ per cent. He understood that this leakage was not likely to be so large in the future as for the past year, during which time it had been abnormal. He did not doubt that, in the course of next year, they would find that the quantity of gas sold had been greater than 86½ per cent. The capital employed was £15,990, which worked out at £5 12s. 3d. per ton of coal carbonized. This amount compared favourably with other companies with a capital as small as theirs. During the past year they had made 9526 cubic feet of gas per ton; but they had only sold 8240 per ton. Now there was no reason why they should not sell at least 9000 cubic feet per ton, the same as other companies. If they had done this, a saving of 240 tons of coal, which at 19s. 10d. per ton amounted to £238, would have been effected. Then, again, 59⅓ per cent. of the coke made had been used at the works, which was a large percentage. If only 40 per cent. had been used, there would have been an additional 329 tons of coke for sale, which, at 14s. a ton, would have realized £230. Then there was nothing received for ammoniacal liquor—in fact, he found there was a loss of £6 11s. on that account; for it was said that the liquor was so exceptionally weak that a considerable sum had to be paid to get it carted away. All this was wrong; for the liquor could have been made stronger without any difficulty, and it could have been converted into sulphate of ammonia and sold. And if it had been, there would have been probably an income from this source of at least £120. The general expenses which had been incurred in connection with the last year's working were altogether out of proportion to what they ought to be; for they came to 24·71d. per 1000 cubic feet of gas sold. Now, if the working expenses had been but 20d. only, which was quite as high as they ought to be, 4¾d. for every 1000 cubic feet of gas would have been saved, which would have amounted to £460. On the items he had mentioned, there had been a loss of £1048 He doubted not that with very little trouble they could also put their hands on other things where there could have been a saving. So that there was no reason why, in the future, the profit earned should not be as large as that earned by other gas companies; and there was further no reason why the Manager should not be in a position to cause this result to take place. Out of the profit of £194, and the balance with which the year was commenced, £91 10s. 4d., income tax amounting to £37, and interest on the bonds and bank overdrafts amounting to £55, had to be paid. So that there was £193 to go forward to next year. Looking at their assets and liabilities, they would find that their stock in hand amounted to £1422; amounts owing by sundry persons for rentals, £1067; and owing for residuals and fittings, £568 13s. Then they had as an asset of the Company the suspense account of £1813. It was an asset of the Company in so far that it had to be paid out of future profits which were pledged to that extent. The liabilities of the Company were as follows: For coal and other material delivered, £2488; banking account overdrawn, £1092; owing to consumers for deposits and interest, £49; unpaid dividend, £7; due to reserve fund, £990; to capital account, £51; and balance unappropriated on profit and loss and nett revenue account, £193. In conclusion, Mr. Lass remarked that a new set of books had now been made out, and everything was fair and square for a good sound prosperous time; and he saw no reason why, with proper management, things should not go on regularly, and show a sufficient amount of profit to pay a dividend upon the amount of capital invested.

After some questions had been asked and answered,

The CHAIRMAN moved the adoption of the report and balance-sheet.

Mr. R. COCKS seconded the motion.

Mr. J. GRIPPER, in the course of a few remarks, expressed the opinion that the Directors were greatly to blame for the state of things that had come to pass. He considered they ought to have seen, by the large amount put down to the different items in past balance-sheets, that things were not what they ought to be. Referring to the old books, he said that the Directors, as soon as they thought things were not as they should be, ought to have put an embargo on them, which would have prevented all the bother that had occurred, and should have at once placed them in the hands of a chartered accountant, to make up. Past profits were fictitious; and the shareholders had been receiving money to which they were not entitled, and which the Company had never earned. The management must have been bad, or the £1048 mentioned by Mr. Lass as the amount which might be saved in the working, would have been available towards the £1100 required to pay a dividend.

Mr. MUNNINGS, as one of the Auditors, pointed out that they had not the slightest idea that £500 more was owing than was accounted for in last year's balance-sheet; and he presumed that the Directors had not. He could not understand how it was £166 more had been collected than had been paid into the bank; and he thought this circumstance required explanation.

Mr. R. W. BRETT, sen., remarked that the amount was only an estimate. No positive assertion was made that this amount had been collected.

Mr. LASS said that receipts for some amounts supposed to have been owing had been produced.

Mr. BRETT said that was due to the accounts having to be got together as best they could from the details they had at hand. He complained that, when Manager, he did not have the help that was necessary to keep the books. If efficient help had been given him, he felt confident that nothing would have occurred. It was a case of "the last straw" breaking the "camel's back." Mr. Lass himself had said that the staff was insufficient, although the report did not state that.

Mr. LONGMORE expressed the opinion that the shareholders were to blame as well as the Directors for what had occurred, through not attending the meetings and taking an interest in the affairs of the Company, instead of leaving everything to the Directors. He congratulated the Directors upon having at last appointed skilled auditors to take charge of the books—remarking that it was a step which should have been taken long since. He deplored the statements in the report put before them; but he considered that the wisest thing for them to do now was to accept the position, and ask the Directors to do their utmost to bring the business up to a prosperous state.

After some few further remarks, the report and balance-sheet were adopted, and ordered to be printed and circulated.

The election by the Directors of Mr. R. Watson, the Manager of the gas-works, as Secretary to the Company was confirmed; his remuneration for the office being fixed at £40 per year.

At the close of the business of the annual meeting, an extraordinary general meeting was held for the purpose of authorizing the creation of capital to the amount of £3000; being the remaining portion of the first of the two sums of £6000, power to issue which was granted to the Company by the Hertford Gas Act, 1864. The capital is to be raised by the issue of shares to the amount of £10 each, either as ordinary shares or preference shares, and subject to the conditions and provisions prescribed by the Act. Authority was given for the raising of the necessary capital; and the proceedings terminated.

PROVINCIAL GAS COMPANIES.

The Chairman of the Dover Gas Company (Mr. W. Mannering) had, on the whole, an eminently satisfactory statement to lay before the shareholders at their recent half-yearly meeting. The report has already been briefly alluded to (*ante*, p. 446); but the Chairman gave some additional interesting particulars. He said that a noticeable feature of the half year had been the large increase of 10¾ per cent. in the sale of gas, as compared with the corresponding period of 1894. A great deal of this was doubtless owing to the severe weather in January and February; but a considerable increase was maintained throughout the six months, and was still going on, which might be attributed to the growing demand for gas for cooking and heating purposes, as well as to the extension of business generally. There had been a loss of revenue owing to the low price obtained for sulphate. The difference, as compared with the receipts for that product in the corresponding period, was £314. There was also an increased outlay in providing and fixing incandescent burners in the public lamps in some of the leading thoroughfares. The change had, so far, proved a success; and the great improvement in the lighting, arising from the use of these burners, appeared to have given general satisfaction. He certainly thought that the brilliancy of the modest little incandescent lamps compared favourably with the towering arc lights of the Electric Light Company. As to the accounts, the receipts for the half year were £1298 more than for the same period of 1894; and the increase was accounted for as follows: Gas-rental, £1083; coke, tar, and other residuals, £172; and meter and other rentals, £48 more. The payments were £1303 in excess of the corresponding half year. Coals had cost an extra £781; the large amount of gas necessitating the use of an additional 1000 tons. The financial result of the half year was a profit-balance of £2696, or £14 more than the amount required for the dividend. Under the able management of Mr. R. Herring, very satisfactory results had been obtained in the manufacture. During the six months, 8913 tons of coal were carbonized, which produced 97,925,000 cubic feet of gas, equal to 10,986 cubic feet per ton of coal. The quantity sold and used was 91,642,600 cubic feet, equal to 10,281 cubic feet per ton of coal The gas unaccounted for was 6·41 per cent. Before concluding, the Chairman expressed regret at the loss by death of the Company's Chief Clerk (Mr. G. J. Roberts), who had faithfully served them for 35 years. The report was adopted; and a dividend at the rate of 7½ per cent. per annum was declared. On behalf of the shareholders, Mr. Mowll suggested that the Directors should recognize in some substantial way Mr. Roberts's long services; and the Chairman intimated that the matter was receiving the Directors' careful consideration at the present time.

In moving the adoption of the Directors' report (noticed on the 3rd inst.) at the annual meeting of the Falmouth Gas Company, the Chairman (Mr. R. M. Tweedy) said he was doubtful whether it would be the last annual meeting, as the Board were in communication with the Corporation regarding the proposal to buy the Company's property. The Directors had offered them every facility; but it was thought the purchase of the gas-works was rather a heavy matter for the ratepayers, and that more money would be required than the Corporation would be disposed to give. However, he congratulated the shareholders on the improved state of affairs. The quantity of gas consumed was 1¾ million cubic feet more than during the previous year, owing principally to the introduction of the penny-in-the-slot meter system. Receipts had improved in every direction, aggregating £338 more that in 1893-4. The report was adopted; and a dividend of 11 per cent. was declared.

The report of the Directors of the Keswick Gas Company, which was noticed in the JOURNAL for the 3rd inst., was submitted to the shareholders at their annual meeting held on that date. In moving its adoption, it was pointed out by the Chairman (Mr. R. Mumberson) that coal had cost 10d. per ton more than in the preceding year, and that, with an increased consumption, there had been an extra expenditure of £274. The receipts from ammoniacal liquor had considerably increased; but they would not be so fortunate with it this year. It was encouraging to find that the Company were better by something like £368 than in the previous year. The report was adopted; and a dividend at the rate of 8½ per cent. upon the original capital and of £5 19s. per cent. upon the additional capital was declared. The Chairman afterwards mentioned that the Directors had found it necessary to make provision for additional gas storage; and they had entered into a contract with the Whessoe Foundry Company, Limited, for a new holder, with a steel tank. From statistics prepared by the Secretary (Mr. J. H. Brodie), it appears that the Company have now 238 cooking-stoves out on hire, and 137 prepayment meters fixed. During the past year 15,578,300 cubic feet of gas were made, which was an increase of 2,250,400 feet on the preceding year. The unaccounted-for gas was equal to 7 per cent. The quantity of coal carbonized was 1490 tons; the average production of gas being 10,455 cubic feet, which speaks well for the management of Mr. T. Heywood. The new gasholder will be 58 feet in diameter by 20 feet deep; and the tank 62 feet diameter by 20 ft. 6 in. deep This will give an increased storage accommodation of 52,500 cubic feet; but, as a small holder will be put out of use, the net increase will be 39,500 feet.

It was stated at the recent half-yearly meeting of the Kingston-on-Thames Gas Company that there had been an increase of 14 per cent. in the consumption of gas. Owing to the considerable growth of the business, it had been decided to enlarge the manufacturing and purifying plant, and to erect a new gasholder, having a storage capacity of 1½ million cubic feet. This would economize labour, and avoid the necessity of working on Sundays. The maximum dividends were declared.

The Directors of the Newmarket Gas Company had a healthy report to lay before the shareholders at the recent meeting. The business, they stated, continued to increase; and consequently they had decided to reduce, from July 6 last, the price of gas to all the consumers—viz., from 4s. 8d. to 3s. 10d. at Exning, and from 4s. 2d. to 3s. 10d. at Newmarket—making the charge uniform throughout the district. As a result of the working during the year ending July 31 last, the Directors were able to report a net balance of profit available for dividend of £5029, from which they recommended a dividend at the rate of 12 per cent. on all the capital, which would absorb £3600. The report referred to what is being done in fitting up small houses under a prepayment system, and also alluded to the Company's new Act of Parliament, which came into operation on Aug. 1, and which the Board believed would prove alike advantageous to the proprietors and the consumers. The Chairman (Mr. R. Stephenson) mentioned that the dividend was 1 per cent. in advance of the previous one; and, in a short allusion to the new Act, he said he was bound to make a few remarks as to their able Secretary and Manager (Mr. J. H. Troughton). It was no use having good officials looking after their interests in London, unless they had at home a capable Manager who knew what they wanted. This he must say described Mr. Troughton. He had gone most carefully into every detail of the Bill; and he was entitled to their best thanks for the splendid service he had rendered them. The report and recommendation as to the dividend was adopted.

The Queenstown (Ireland) Gas Company report a net profit of £761 on the working of the half year, which it is proposed to allocate as follows: £103 to the payment of interest on the debenture loan, £623 to the payment of the full statutory dividends at the rate of 10 per cent. on the "A" shares, 5 per cent. on the "B" shares, and 7 per cent. on the "C" shares, less income-tax; the balance to be added to the reserve fund. The price of gas has been reduced from April 1 last by 3d. per 1000 cubic feet.

The Shotley Bridge and Consett District Gas Company report that, during the six months ending June 30, the consumption of gas was 21,917,000 cubic feet, which was an increase of 6½ per cent. The balance of revenue is £1456, which has permitted of the declaration of a dividend of 5 per cent. on the consolidated stock and "A" capital, and 3½ per cent. on the "B" capital.

At the recent meeting of the Truro Gas Company, it was reported that there was a gross profit for the past year of £3176, and a net profit of £866. A dividend of 7½ per cent. (£900), against one of 10 per cent. (£1200) for the preceding year, was recommended. It was explained that the expenditure had been greater than usual during the past year; considerable outlay having been incurred on buildings, works, mains, and services, in order to place them in a thoroughly efficient state. The sales of gas had realized £5543. Coal, wages, salaries, and other expenses amounted to £6339; rent, rates, and taxes absorbed £361; debenture interest, £264; and additions, renewals, and repairs, £1182. The capital of the Company is £18,850, the whole of which has been called up. A paragraph referring to the proposed econstruction of the Company appears in another column.

Welsh Water for London.—The Usk and Ebbw Board of Conservators had under consideration last Tuesday week, the proposals of the London County Council for procuring water from South Wales and Monmouthshire. The Board determined to ask the landowners and others to subscribe towards a fund for obtaining expert advice as to the rainfall, &c., so as to be prepared with figures when the matter is brought before Parliament, to show why the scheme, in so far as the Usk is concerned, should not be carried out.

The Pontypridd Water Company's Supply.—A letter bearing upon the subject of the recent shortness of water in the Rhondda Valleys, was read at the meeting of the Pontypridd District Council last Thursday week. It was written by the Secretary of the local Water Company, and stated that a good deal of the grievances in connection with the scarcity of supply had arisen owing to the great subsidence of the ground in the mining district. In consequence of circumstances over which the Company had no control, occasionally a portion of the water went into the mains unfiltered; but the bulk of the water was properly purified. It was believed that the contractors for the new works at Mardy would complete them within the specified time.

HALIFAX CORPORATION GAS DEPARTMENT.

An Analysis of the Cost of Gas.

We are indebted to Mr. Thomas Holgate, the Gas Engineer of the Halifax Corporation, for a comparative statement of the results of the operations of his department during the years ending March 31, 1894 and 1895. Generally speaking, the figures disclose substantial progress —the make and sale of gas having increased with a diminution in the cost per 1000 cubic feet.

Dealing first with the information as to the manufacture, the quantity of coal carbonized last year was 69,554 tons; and in 1893-4, 64,828 tons. In the former period, 13·2 per cent. of cannel hub was used; and in the latter, 12·74 per cent. The cost of coal was in 1894-5 £29,066, and in 1893-4 £36,401; or per 1000 cubic feet 11·12d. and 14·84d. respectively. Deducting the receipts for residual products—viz., £18,109 in 1894-5, and £20,115 in 1893-4—leaves the net cost of coal in the two years at £10,957 and £16,286, or per 1000 cubic feet 4·19d. and 6·64d. The other items under the head of manufacture of gas (the first figures being for 1894-5, and the second for 1893-4) were: Carbonizing (wages, tools, and removal of refuse), £9948 and £11,361; purifying, £1409 and £1814; maintenance of works, £8926 and £7410; management and general charges (four-fifths), £1052 and £1050; Town Hall expenses (one-fourth), £608 and £592; rates and taxes (one-half), £1495 and £1451; interest (two-thirds), £6783 and £6693; and sinking fund (two-thirds), £3956 and £3359. These figures made the total cost at the works in 1894-5 £45,136, and in 1893-4 £50,017; or per 1000 cubic feet 17·27d. and 20·39d. Under the heading of distribution of gas, collection of accounts, &c., the following are the comparative figures for the two years: Meter inspectors' wages, £832 and £816; repairing meters, £710 and £599; repairing mains and services, £3366 and £3580; management and general charges (one-fifth), £263 and £262; Town Hall expenses (three-fourths), £1824 and £1776; rates and taxes (one-half), £1495 and £1451; interest (one-third), £3391 and £3346; and sinking fund (one-third), £1978 and £1679. The gross cost outside the works for 1894-5 was £13,860, as against £13,513, or per 1000 cubic feet 5·30d. and 5·51d. Deducting the meter-rents (£2437 and £2359), made the net cost outside the works £11,423, compared with £11,154; or per 1000 cubic feet 4·37d. and 4·55d.

The total receipts for gas amounted to £63,051 in 1894-5, and to £61,398 in 1893-4; or 24·12d. and 25·03d. per 1000 cubic feet. The total cost of the supply was £56,559, as against £61,171; or per 1000 cubic feet 21·64d. and 24·94d. The net profit last year was £6492, compared with £226 in 1893-4; or per 1000 cubic feet 2·48d. and 0·09d.

With regard to the manufacturing results in 1894-5, 681,824,000 cubic feet of gas were produced, or 9803 feet per ton of coal; 627,144,700 cubic feet were sold, and 7,631,500 feet used on the works (together 634,776,200 feet, or 9127 feet per ton of coal); leaving the unaccounted-for gas at 47,047,800 cubic feet, or 676 feet per ton, being equal to 6·90 per cent. The average illuminating power was 17·61 candles. The corresponding figures for 1893-4 were: Gas made, 640,786,000 cubic feet, or 9884 feet per ton; sold, 588,570,700 feet, and used on works, 8,235,000 feet (together 596,805,700 feet, or 9206 feet per ton of coal); unaccounted for, 43,980,300 cubic feet, or 678 feet per ton, being equal to 6·86 per cent. The average illuminating power was 18·01 candles.

THE PUBLIC LIGHTING CONTRACTS FOR WEYBRIDGE.

An Extraordinary Muddle.

A singular statement was made by Mr. W. F. Ward at the last monthly meeting of the Weybridge District Council, which reveals a peculiar looseness in the conduct of the business of this body. The subject was the public lighting of the district, the recent proceedings in connection with which were described by Mr. Ward as "extraordinary, irregular, and illegal;" and the Council have consequently fallen into a "hopeless muddle." A remark made by Mr. Ward in the course of the meeting leads one to assume that he is a lawyer; and it would be interesting to learn why he allowed his colleagues to drop into a muddle of this kind. The secret may perhaps be found in the declaration by Mr. Ward (who, by the way, is the Vice-Chairman of the Council) that he believed the Chairman (Mr. E. Till), if he set his mind on doing a certain thing, "would move heaven and earth to do it." The story of "illegal" procedure, briefly told, is this: On July 10 last, a Lighting Committee was formed, to whom the Council delegated their powers of lighting. On that occasion, it was proposed by Mr. Ward that the Council should purchase standards and lamps for lighting the district with oil. This was carried; and the resolution was subsequently duly confirmed. The Lighting Committee afterwards resolved to hold a public meeting, to ascertain the views of the ratepayers on the question of lighting. This was confirmed by the Council; and the public meeting was held on Aug. 7, and adjourned to Aug. 14. In the meantime, however—on Aug. 8—a meeting of the Council was held, and resolved into Committee, to consider "the lighting of the parish." Such a proceeding as a Council resolving into Committee over a Committee which they had already formed to consider a particular matter is, Mr. Ward asserts, without precedent. At this meeting, on the motion of the Chairman, it was agreed that a contract be entered into with the Walton Gas Company for one year certain. Could anything, asks Mr. Ward, be more monstrous when there was already the resolution confirmed by the Council that standards and oil-lamps should be purchased? How could they pass the second resolution without rescinding the former one? To do this, there is a regular process to go through; and, moreover, the resolution of Aug. 8 was actually passed behind the backs of the public while they were engaged in considering the best means of lighting. Then the Council appointed a Committee to negotiate with the Gas Company; and on Aug. 13, this Committee made a verbal report as to the terms of the Company. Standing Order No. 39, Mr. Ward points out, provides that every report of a Committee shall, if required, be presented in writing, and be entered in the minute-book. Was there, he inquired of his colleagues, no record of this report? After the inhabitants had left the matter for the Council to decide, the proper course would have been to have referred back the whole question to the Lighting Committee, so as to conform with the wishes of the public. They would then have been in order; but now the whole proceedings are, Mr. Ward declares, void. At another meeting of the Council, on Aug. 19, the Chairman reported that the Weybridge Electric Supply Company were prepared to do the lighting for a further three months, at so much per lamp. In the minutes of Aug. 10, there is the resolution that the offer of the Gas Company be accepted; but there is no mention of that offer in the minutes of the previous meeting. Three members voted for the resolution, one against, and five did not vote at all. The resolution was declared carried; and the Chairman signed and sealed the agreement with the Company. On this point, Mr. Ward said: Could anything be more extraordinary than that? He did not think any one of the members could have read the Standing Order No. 42, which said "all deeds and other documents to which the common seal of the Council shall require to be affixed shall be sealed in pursuance of a resolution of the Council, and in the presence of the members of the Council and the Clerk, or his deputy." Where was the resolution directing the contract to be sealed? But, first of all, where was the resolution ordering a contract to be prepared? It was next recorded that the Committee should arrange with the Gas Company to erect 119 lamps in six weeks, under a penalty of £2 for each day over that period. How could they do this? The Committee were appointed to negotiate terms with the Gas Company; and when they reported as to that for which they were legally appointed, their functions ceased. Having shown the members the errors of their ways, Mr. Ward wound up by informing them that he had already been instructed to issue a writ against the Council; but he did not wish to do that. They must consider how to get out of the mess they had so cleverly got into; and, if he could help them, he would, although at present he could not see how it was to be done. They had entirely ignored their own Standing Orders by passing resolutions without proper notice being given. He suggested that the facts should be laid before Mr. Glen, and that they should ask his opinion as to the position of the Council. He had gone as far as to consult Counsel himself; and he had no hesitation in saying that, if he took proceedings against the Council, the gentlemen who had done this thing would have to pay for it. There was a conversational discussion on the subject, in which it was generally agreed that the Council were in a predicament. Dr. Powell inquired whether, if the contract with the Gas Company was illegal, as far as the Council was concerned, it was binding on the Company? Mr. Ward replied that if a contract had been entered into, and the Council did not fulfil it, they would no doubt be liable. He elicited that the contract had not been signed by the Company; but the Clerk stated that he had received a letter from the Manager, stating that he was prepared to get all the lamps erected and ready for lighting in the busier parts of the town before the end of September, and the remainder within two weeks later. It was agreed that the whole of the minutes and proceedings as to the lighting of the town should be submitted to Counsel for his opinion as to the position of the Council.

ELECTRIC LIGHTING NOTES.

According to information which has reached the Antwerp correspondent of *L'Etoile Belge*, there is likely to be a rupture between the Antwerp Municipality and the local Hydro-Electric Supply Company. It may be remembered that the Company were granted a concession in February, 1891, for a combined hydraulic and electric supply system; and it seems that they have now applied to have the terms of the concession altered in no fewer than nine respects. The matter has been submitted to the Municipal Engineer (M. Royers), who has advised that the application should not be entertained. The Company, first of all, do not wish to extend the hydro-electric system; and on this point M. Royers is indifferent. He says it does not matter to the consumer whether the current is generated by a steam-engine or by any other kind of power; and as the Company have laid down the seven or eight miles of pipes they undertook to provide, there is no need for a revision of the contract in this respect. But they go farther, and ask to be allowed to give up the hydraulic supply system entirely; and it is here that the Municipal Engineer comes into collision with them. When the contract was originally discussed, prominence was given to the point that this system would enable large consumers to produce electricity on their own premises, and so get their light at less than the cost of gas—in fact, that it would be a serious competitor with gas. M. Royers appreciates this position; and he does not quite see why the competition should cease. Its advantages, on the score of price, were adduced as a reason for the prolongation of the gas concession by some fifteen years. Moreover, with the proposed new conditions of working, the Company seek to revise the payments to be made into the municipal treasury; and the sum they suggest is regarded by M. Royers as about 50 per cent. too low. The main point, however, is the establishment of a monopoly, not only of electric lighting, but also of the electrical distribution of power, until 1905. A monopoly of any kind should be granted with caution; but, the Municipal Council having sanctioned it in this case, M. Royers thinks the public will be best served by its continuance as a healthful competitor with gas. There seems, consequently, to be but little prospect of the Company's proposals being accepted.

The profit and loss account of the Brush Electrical Engineering Company for the year ended June 30 shows a gross profit of £37,858, after providing for bad and doubtful debts to the amount of £2205, and writing down the value of shares and debentures in other companies. After deducting from the gross profit, general charges, maintenance of buildings, plant, and patents, staff bonuses under the Company's profit-sharing scheme, and interest on debenture stock, there remains a net balance of profit (after including the amount brought forward from last year) of £11,329. An interim dividend at the rate of 6 per cent. upon the preference shares, and at the rate of 5 per cent. upon the ordinary shares, has been already paid for the half year ended Dec. 31, 1894,

amounting to £12,150. The net profit for the year, exclusive of the amount brought forward, is £7541. The preference shareholders have already received £5400 of this amount by way of interim dividend as above; and they will be entitled to receive the balance of £2141 before the ordinary shareholders receive further dividends. While the Directors regret this result of the year's operations—which shows a decrease of net profit as compared with last year of £19,739—they state that it is solely due to loss incurred during the second half of the Company's financial year in connection with the contract which the Company is carrying out for the City of London Electric Lighting Company, and arises out of differences between the two Companies as to the obligations involved under the contract. The Directors report that these differences are now at an end; and work under the contract is being again proceeded with.

The arrangements for the scheme for lighting the main streets of Swansea by electricity, and at the same time using the plant for the purpose of destroying the town refuse, are now complete; and the Committee who have the matter in hand have prepared their report for presentation to the Council. The estimated cost of the work is about £50,000.

It was reported to the Middlesbrough Town Council last Tuesday that the Electric Lighting Committee had, in accordance with the instructions of the Council, asked Mr. R. Hammond to report on the least cost of an economically working electric lighting plant. Colonel Sadler warned the Council that the most influential ratepayers were strongly antagonistic to any expenditure on electric lighting, and very important public action would be taken to prevent it. It was felt that the time was inopportune, because the rates were exceedingly high, and because at the present moment there was such a considerable change in the modes of applying gas for the purposes of lighting. Within the last three years, the most remarkable advance had been made in utilizing gas, so as to extract the best possible light from it. Alderman Jones remarked that the Committee did not at present propose to incur any expense in an installation.

Projected New Schemes of Rural Water Supply.—The Stratford-on-Avon Rural District Council have instructed Mr. J. E. Willcox, of Birmingham, to submit schemes of water supply for the parishes of Alveston, Tiddington, and Moreton Morrell, within their district. The Rural District Council of Winchcomb (Gloucester) have also called in Mr. Willcox to report and advise on schemes of water supply for the villages of Gretton and Guiting Power.

The Bolton Corporation and their Gas Stokers.—The Bolton Corporation are having some further trouble with their gas stokers, who are now accused by the Gas Committee with breach of faith. At a recent meeting of the men, the following resolution was passed: "That the stokers at the Lum Street works have come to the unanimous conclusion that the trial of 3 tons 12 cwt. on Aug. 1 and 2 has given us the satisfaction that it is more work than we can possibly do under the present arrangement. We think also that we have fulfilled our part of the agreement drawn up by the Gas Committee; and therefore we do not see our way to entertain the suggestion made by the Committee, that we should pay back the money we have received since the date of the agreement—namely, April 4, 1895." This resolution was considered by the Gas Committee last Friday; and, after some discussion on the various points raised, the following resolution was agreed to: "That the stokers at Lum Street works be informed that the Committee have received with much regret their resolution refusing to comply with the undertaking given on their behalf for the repayment of the additional wages which they have received from the Corporation upon the faith of the arrangement of the 4th of April last, and must regard such resolution as a breach of faith and indicating a disposition on the part of the workmen which is destructive of confidence in them in the future." These resolutions, which indicate the present position of affairs, will be brought before the next meeting of the Town Council.

Re-construction of the Truro Gas Company.—The Truro Gas Company was established some 75 years since; and its present capital is about £18,850. An extraordinary general meeting of the shareholders is to be held to-day for the purpose of sanctioning the re-construction of the Company. It has long been felt desirable that some steps should be taken to relieve individual shareholders from future unlimited liability, and that the objects of the Company should be extended and its constitution modified to enable this to be carried into effect. The management are satisfied that the proposed modifications would be advantageous to the Company; and Counsel has advised that such modifications can only be effected by the Company going through the form of reconstruction. The scheme is this: (1) A new Company limited by shares, to be formed under the provisions of the Companies Acts 1862 to 1893, under the name of "The Truro Gas Company, Limited," and with a capital of £25,000, divided into 25,000 shares of £1. The objects of the Company are to include the objects of the present Company, and also full power to carry on the business of an electric light company in all its branches, and such other powers as may seem expedient. (2) The undertaking of the existing Company to be made over to the new Company upon the footing that the new Company shall undertake all the debts and liabilities of the existing Company, and shall pay all the costs of winding it up and dissolving it, and all the costs of carrying the re-construction scheme into effect; and further shall allot to every member of the existing Company 50 shares of £1 each fully paid up in the new Company in respect of every composite £37 10s. share (£25, £5, and £7 10s. shares) in the existing Company held by such member, or a proportionate number in respect of the separate shares of smaller amounts. Cash will be paid in the same proportion in respect of the part of an old share, where such part is of less value than a new £1 share. (3) The re-construction to be carried out under section 161 of the Companies Act, 1862, and accordingly the existing Company to go into voluntary liquidation, and to authorize the Liquidators to carry out the re-construction immediately; so that there may be no interruption of the business. (4) With all convenient speed, the existing Company to be dissolved.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

It is with a feeling of the most extreme regret (and I am certain that a great many of your readers share the sentiment) that I have this week to record that the hand of time now presses so heavily upon Mr. T. Whimster, the veteran Engineer and Manager of the Perth Corporation Gas-Works, that he has felt it necessary to resign his post. There is something in the circumstance of the resignation occurring at the present time which makes it more striking than it would otherwise have been. The Gas Commission, as I have already intimated, are in the midst of the consideration of the very important question of the removal of the gas-works to a new site. I fancy that I am not very far wrong when I say that some of the Commissioners have set their minds upon the particular site which has been reported upon—the Sand Island, at the shore—and that Mr. Whimster, in his report on the subject, felt himself rather obliged to report upon the capabilities of the site, than to criticize it. The site has not yet been adopted. Before either it is adopted, or rejected, there will probably be a good deal of controversy; and it therefore looks as if Mr. Whimster did not wish to have anything more to do with the matter. In this, I think he is right. If the proposed new site had been altogether a suitable one, it would have been a pleasure to him to have superintended the transfer of the works, and a solace to him in his declining years to look back upon the placing of the business upon a footing which would be permanent for, no one could say how many, generations. But with the prospect of conflict within the Commission, and, after all, the production of a job not in all respects satisfactory, the situation was greatly changed, and it is possible to sympathize with him in his resolution rather to go out than to have all the trouble of the transfer, and have his name associated with what might turn out to be not so good as was expected.

Mr. Whimster sent in his resignation; and it was considered at a meeting of the Gas Commission on Thursday. The Commissioners, with regret, agreed to accept it; and they unanimously voted him a retiring allowance of £120 a year. He is to be released from his duties on the appointment of a successor. I am not sure whether Mr. Whimster or Mr. Jesse Hall, of St. Andrews, was the father of the gas industry in Scotland; but the distinction lay between them. Mr. Whimster's departure from the scene leaves Mr. Hall in undoubted possession. Mr. Whimster's has been a long and honourable connection with the gas industry. He has spent all his working life in connection with it at Perth. More than 50 years ago, he was appointed collector for the Perth Gas Company; and 42 years ago, he was promoted to be Manager. When the transfer of the Company's undertaking to the Corporation took place in 1871, he was retained in his post; and he has thus served, as Manager, with the Company for 20 years, and with the Corporation for the last 24 years. He has seen the consumption of gas in the city more than quadrupled in his time; and it is still growing rapidly. Month by month, large increases in consumption are reported. For last month, the increase over the corresponding period of last year was 720,500 cubic feet. Though he has been feeling the burden of years for some time past, he has kept himself and his works abreast of the times, in a spirit which would have done credit to a man entering upon his career, instead of, as in the course of Nature he was, approaching its termination. Not many years ago, he was a mover in the scheme for the extension of the gas-works, in connection with which he had to face considerable difficulty; but he carried his point, and great advantage has resulted. He was also so advanced in his ideas relating to gas manufacture that, when the Peebles oil-gas process was brought out, he almost immediately adopted it. He has worked it with success, even to the making of gas, by its means, from tar; and he has been one of the staunchest advocates of the process. In fact, his last public appearance at a gas managers' gathering was a speech he delivered in support of the Peebles process, at the meeting of the North British Association of Gas Managers, that was held at Glasgow in July of last year. On that occasion, he ventured to express the hope that he might come back and tell them more about it. He may, and I trust he will, be spared to give his brethren the benefit of his further working of the process. In this connection, I may say what was in my mind at the time when the Association, at their meeting in Melrose this year, resolved to meet in Edinburgh next year. Recalling Mr. Whimster's promise, I thought it a pity that the members did not select Perth, which was one of the places voted upon, as their meeting place for next year, as he might then have been better able to attend than he will be in Edinburgh. Mr. Whimster was one of the original members of the North British Association, and was for long one of its most active members; and I thought that, in studying his convenience, they would have been doing him the honour he deserved, and would also have been honouring themselves. Mr. Hall, of St. Andrews, is now the only remaining original member of the North British Association who is in active work. Mr. Whimster's retirement from business life, thus leaves a blank which cannot be filled up. His post at the Perth Gas-Works will be; but the original members of the Association can never be replaced. He has, however, done his life-work well; and to his retirement he will carry with him the good wishes of all his colleagues, and their hope that he may have a quiet and pleasant evening to his active life.

The Waverley Association of Gas Managers, which is the oldest of all the gas managers' associations, held their sixty-ninth half-yearly meeting at Dunbar on Thursday. There was an attendance of about twenty managers, over whom Mr. W. Smith, of Melrose, presided. Mr. Smith, in his opening address, spoke hopefully of the future of gas lighting. The address was quite a fair production; but the discussion, or rather conversation—for the proceedings are quite of an informal nature—which followed, was too rambling to be of use to anyone, except the members themselves. This will be apparent when it is stated that a considerable part of the conversation was upon the subject of whether a certain maker's retorts were better than another's. Such a subject would, no doubt, be quite suitable for a private talk, but would scarcely do in a discussion which was to be made public. To be

sure, the Association prefer to meet without the presence of the Press—at least I was once told so by one of the members—and I have never sought to attend any of their meetings. On the other hand, one of the members the other week extended an invitation to me; but I thought he was speaking without book, and did not accept it. I learn, however, that one of the awkwardnesses of the arrangements for the meetings of the Association is that the trades are admitted. With the representatives of tradesmen present, there can be no privacy; and this was exemplified on Thursday by the fact that one of them, thinking his particular product was being hardly dealt by, intervened in the conversation. This was a trifle unseemly, and might lead the Association to consider whether it would not be better for them to make their meetings more formal and regular, one effect of which would be to raise the tone of their gatherings and improve their quality. On the motion of Mr. Blair, of Haddington, Mr. Smith was thanked for his address. The company afterwards dined in the Royal Hotel.

The Works Committee of the Edinburgh and Leith Gas Commissioners have this week resolved to recommend that the price of gas should be reduced from 3s. 2d. to 3s. per 1000 cubic feet. Since the Commissioners acquired the gas undertakings of the two Companies in 1888, the price of gas has fluctuated greatly. At that time it was 3s. 6d. But very soon the trouble with the cannel trade, which marked the earlier years of the present decade, began; and, in the end of 1889, they advanced the price to 3s. 9d. In 1891, they raised it to 4s. 6d.; but in the end of 1892, they were able to reduce it to 3s. 10d. In the latter half of 1893, they brought it down to 3s. 6d.; and in January of this year, to 3s. 2d. The price they are now going to sell it at is the lowest which has ever been charged for gas in the city. The Commissioners are to be congratulated upon the success they have, with experience, achieved in their working of the undertaking.

The sixty-first annual general meeting of the shareholders of the St. Andrews Gas Company, of which Mr. Jesse Hall is Manager and Secretary, was held on Wednesday. It was reported that the quantity of gas manufactured during the year was 29,523,000 cubic feet, an increase over the quantity in the preceding year, of 2,276,900 cubic feet. The quantity of coal carbonized was under 3000 tons—an increase of 257 tons. This makes an output of about 9800 cubic feet per ton of coal, which is a very good result for works of the size of St. Andrews. On the motion of the Chairman (Mr. J. R. Welch) the report of the Directors was adopted; and it was resolved to reduce the price of gas from 3s. 9d. to 3s. 6d. per 1000 cubic feet. The Chairman said that last year they expended upwards of £200 in increasing the storage for coal; and it would be necessary during the current year to spend more than £400 upon the works. They had at present a stock of 1200 tons of coal on hand. If the town increased at the same rate as it was doing, it would be necessary, at no very distant period, for them to consider the question of the removal of the works to a site outside the town, as every available inch of ground was now taken up; and they had practically no room left for further extensions. He attributed the flourishing condition of the Company to the admirable manner in which the works had been managed by Mr. Hall and his son; and he proposed that the thanks of the shareholders to them should be recorded in the minutes, and a bonus of £35 granted to them. The seconder of the Chairman's proposal bore testimony to the excellent way in which the affairs of the Company are conducted. These tributes of praise were not by any means too highly pitched, for Mr. Hall's management of his works, in a confined situation, is well known to be admirable. When it is considered that there is a large carting account, it is a wonder that he is able to deal with affairs so that gas should be sold at 3s. 6d.—a price which, being without meter charges, the Chairman explained was equal to 3s. 4d. per 1000 cubic feet. In some works where the output is much larger, the managers would be glad if they could sell gas at a proportionately low figure.

This week has seen the most of the annual Valuation Courts held in Scotland. So far, I have observed no difficulty anywhere in the fixing of the valuation of gas-works. The only reference I have seen at all to such valuations is a passing notice to the effect that at North Berwick the valuation of the gas-works has been reduced by £157. The Corporation are owners of the works, which possibly accounts for their willingness to place a moderate value upon them.

As bearing out the "Note" which I wrote a fortnight ago regarding the increased amount of public lighting which is likely to be required when rural local authorities begin to exercise their powers under the Public Health and Local Government Acts, I may mention that a proposal is on foot to constitute the district of Giffnock, near Paisley, into a special lighting district. In connection with the proposal, the Busby and District Gas Company have been asked to furnish rates for lighting, and have done so; these being, for all-the-year-round lighting, 30s. per lamp per annum for gas, and 10s. per lamp for lighting; and for six months' lighting, 20s. per lamp for gas, and 5s. for lighting. At a meeting of the local District Committee, the Chairman said he considered they should not have a larger assessment than 4d. per pound for lighting. The offer of the Gas Company has not yet been agreed to. I may say that I consider the figures very high. They are certainly very much higher than is usually paid. But there may be exceptional reasons for an extra charge for rural than for burgh lighting; and I mention the figures in order that they may be a guide to others who may be in the same position.

At both Dunfermline and Millport, where the proposal is being made that the Corporations should acquire the local gas undertakings, the subject was before the Town Councils this week. The Dunfermline Council agreed to call a public meeting to discuss the proposal. In the Millport Council, after much discussion, it was resolved to obtain additional information as to procedure, and to hold another meeting to consider the subject.

Agitations have been started among both the ordinary coal and the shale miners, with the object of securing an advance of wages. In the case of the ordinary coal miners, it is almost admitted that, in the course of a month or so, they might get an advance of 6d. per day, but that at present they cannot obtain the 1s. per day they ask. In the case of the shale miners, the advance has been refused; and the men, it was understood, acquiesced in the refusal. But since then some of their leaders have been endeavouring to continue the agitation, and have induced the men in some of the pits to agree to hold idle days to discuss the situation. It is not likely that any movements, though persisted in, would succeed at present; and thus prices need not be expected to be affected. Among the arguments used by the managers of oil-works against granting an increase to the shale miners was the statement that, while the prices for oils had advanced, there was a loss of £120,000 estimated on the output of sulphate of ammonia during the year.

The Edinburgh and District Water Trust received eighteen tenders for the construction of the first part of their Talla augmentation scheme; and out of these, the Works Committee selected five for the consideration of the Engineers (Messrs. J. and A. Leslie and Reid). A meeting of the Trust was held on Thursday, at which, on the recommendation of the Engineers and of the Works Committee, the contract was let to Messrs. J. Young and Sons, of Edinburgh—a firm who have done a great deal of work for the Trust. The contract price is £49,113; and the offer of the Messrs. Young was accepted, because it was the lowest in conformity with the specifications, and was the most suitable. The works are to be started on Saturday, the 28th inst., when the customary ceremony of cutting the first sod is to be performed by Mrs. M'Donald, wife of the Lord Provost of Edinburgh.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Sept.* 14.

Sulphate of Ammonia.—During the week, the market has been quiet. Any alteration in prices is rather in favour of buyers. But quotations have been somewhat irregular; and it is difficult to fix exact closing values. The troubles of a London dealer have been the disturbing cause; and it remains to be seen how far this stoppage will affect the market, and in what direction. There is more disposition to buy ahead, but for the most part at prices which sellers do not see their way to accepting.

Nitrate of Soda is quiet at 8s. per cwt.

LONDON, *Sept.* 14.

Tar Products.—Carbolic acid keeps firm; and considerable business is reported having been done during the past week, not only in crude 60's and 75's, but in 35's and 40's crystals as well. Manufacturers hold no stocks; and the price of each quality is likely to be better. Benzol is steady; and, though inquiry is good, there is no improvement in price. Solvent naphtha is in better odour, with more business doing. Creosote oils continue to be a drug; but there is a better demand for heavier oils for grease making and lubricating purposes. The following prices have been noted during the week: Tar, 18s. to 22s. 6d. Pitch, west coast, 35s.; east coast, 37s. 6d. Benzols, 90's and 50's, 11½d. Solvent naphtha, 1s. 0½d. Toluol, 1s. 0½d. Crude, 30 per cent., naphtha, 4⅝d. Liquid creosote, 1½d. Naphthalene salts, 23s. 6d. Cresylic acid, refined, 1s. 1d.; brown, 10d. Carbolic acid, 60's, 1s. 6½d.; 75's, 1s. 9d. Anthracene, "A," 1s.; "B," 9½d.

Sulphate of Ammonia continues quiet, with very little new business being done. Considerable shipments are going on; and sales have been made during the week at prices ranging between £9 and £9 2s. 6d., all ports, less 3½ per cent., f.o.b., bags included. Gas liquor is quoted at 6s. 6d. to 7s. 6d.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—I have already given some particulars with respect to the Salford gas-coal contracts, in regard to which there has been so much controversy and criticism in the district, and the tenders for which were not finally accepted by the Council until the 4th inst. The following further particulars as to the actual quantities of cannel and coal which have been accepted, and the firms who have been successful in securing contracts with the Corporation will, no doubt, be of interest generally. For cannel, tenders amounting to 15,000 tons are accepted—viz., Staveley Coal and Iron Company, 9000 tons; Sutton Heath Colliery Company, 5000 tons; A. Knowles and Sons, 1000 tons. For gas coal, tenders amounting to 90,500 tons were accepted. These were supplied by the following colliery companies: Moss Hall Coal Company, 24,000 tons; Hyde and Co., 12,000 tons; R. White and Sons, 10,000 tons, and 10,000 tons of yard nuts; Clifton and Kersley Colliery Company, 10,000 tons, and 11,000 of washed nuts; Hutton Colliery Company, 5500 tons of nuts; T. Brocklehurst, 5000 tons; S. Scowcroft and Sons, 3000 tons. With regard to the general coal trade, no material improvement can be reported; and pits continue working short time—four days per week being the full average. As regards prices, there is still no upward movement. House coals are, here and there, meeting with rather more inquiry; but, generally, the business doing in these continues very slow, and there is no appreciable increase of buying on account of winter requirements. Prices are without alteration. The lower qualities of round coal are generally in only very limited request for manufacturing purposes; although, here and there, rather more is reported to be doing in descriptions suitable for iron-making. Supplies generally continue a drug upon the market, with excessively low prices quoted to secure orders. At the pit mouth, best Wigan Arley remains at 10s. to 10s. 6d. per ton; Pemberton four-feet and seconds Arley, 8s. 6d. to 9s.; and common house coals, 7s. to 7s. 6d. Steam and forge coals do not average more than 6s. to 6s. 6d. per ton. Engine fuel moves off fairly well; and as the holiday stoppages in the manufacturing districts are now practically over, the demand for mill consumption is getting back to its normal condition. Supplies, however, are plentiful; and prices are not more than maintained at about 3s. and 3s. 6d. for common, to 4s. 6d. and 5s. for best qualities, at the pit mouth. For shipment, only a slow business is doing in steam coals, which can be readily bought at 7s. 3d. to 7s. 6d., delivered at Mersey ports; but in the better qualities of round coal suitable for house-fire purposes, a fair weight of business comes forward; and for these 9s. 3d. to 9s. 6d. per ton is being obtained.

Northern Coal Trade.—The tendency in the coal trade of the North is still, on the whole, towards steadiness; and the demand has been well maintained. The better condition of the iron trade is giving

some ground for the belief that there will soon be a much fuller demand for Durham coal. If this expectation is realized, it would very considerably affect the condition of other kinds of coal than coking, because it would withdraw coal from other markets, and influence prices. In the Northumbrian steam-coal trade, there is still a very heavy shipment; and this gives general activity to the collieries. But there are some of the second-class pits that have to work short time. Best Northumbrian steam-coal is quoted about 8s. 9d. to 9s. per ton, f.o.b.; second-class, 8s. 3d.; and steam smalls, 3s. 3d. to 3s. 6d., according to quality. There is a rather better demand for manufacturing coals; but the price shows no alteration, as so far the supply is more than ample for all requirements. Bunker coals are also in a little better demand; and in one or two instances a slightly higher price is asked, though it is not so readily paid. For unscreened qualities, the quotation varies upwards from 6s. 3d. per ton, f.o.b.; while for the best Durham screened kinds, as high as 9s. is asked. Household coals are slow of sale; and the price, though unaltered, is weak. The gas coal trade is steady; and the fact that the largest of the local users have placed their contracts on the market some months earlier than usual, seems to show that there are anticipations that the price of gas coals may be higher than it is now quoted. For odd cargoes, the price varies from 6s. 3d. to 6s. 9d. per ton, f.o.b.; while contracts that have been taken of late have not been much outside these prices. The deliveries of gas coals are now growing larger; and as there is from week to week an increase in the consumption, it may be expected that in a very short time the collieries will have full work, though there will be the partial counterbalance of the decrease in the exports as the northern ports begin to close. The coke trade is very active; and there is a decided, if not very great, advance in the price, both for export and for local use. The latter shows a strong tendency towards enlargement. For export, 14s. per ton, f.o.b., is now the current quotation; while as high as 13s. has had to be paid for good blast-furnace coke, delivered at the local blast-furnaces. There is no alteration in the price of gas coke this week, but the make is well taken up.

Scotch Coal Trade.—Business continues to improve in Scotland, particularly in the west. In Fifeshire, there is a good deal of disappointment at the absence of demand from the Baltic ports; and stacking is taking place to a considerable extent. Otherwise, the market in Fifeshire is very fair. All-over steam coal is in least demand; but other varieties, and especially splint, are being well looked after. The prices quoted are: Main, 5s. 9d. to 6s.; ell, 6s. 9d. to 7s.; splint, 6s. 3d.; and steam, 7s. 6d. to 7s. 9d., f.o.b., Glasgow. The shipments for the week amounted to 165,154 tons—a decrease of 6724 tons as compared with the preceding week; but an increase of 155,171 tons as compared with the corresponding week of last year. For the year to date, the total shipments have amounted to 4,969,920 tons—an increase of 1,211,721 tons upon the quantity in the same period last year; and an increase of 39,730 tons compared with the same period of 1893.

The Water Supply in East London.—Some serious complaints were made last week by residents in the high-lying districts of Stamford Hill, Wanstead, Walthamstow, and Leytonstone as to the scarcity of water. The cause of the deficient supply has been carefully investigated by the officials of the East London Water Company. In a report on the subject to his Directors, the Chief Engineer (Mr. W. B. Bryan) states that he traced the shortness of the supply in the high levels in the localities above indicated to the operations which are being carried on at Lea Bridge by the London County Council. Workmen are at the present time engaged in widening the bridge. The Company, the report says, had for several months past been effecting alterations in the 42-inch and 26-inch mains under the River Lea for the County Council; and the cutting off of the 42-inch main on Monday and Tuesday last, prevented the working of two of the Company's engines. The result was a deficient supply to the high levels through lack of the necessary pressure on those days.

Ashton-in-Makerfield Gas Supply.—The Manager of the Ashton-in-Makerfield District Council Gas-Works (Mr. J. Hill) has recently submitted a report to his Committee on the position of the undertaking, with the view of enabling them to consider the question of the price of gas. At the same time, he has given the Committee a short description of the works; so that some idea may be formed as to what improvements and extensions would be necessary to meet an increased production of gas. The works were purchased in 1878 for £7563; and they have since that time been practically reconstructed. This has caused considerable outlay; the total amount borrowed and expended having been, on March 25 last, £22,309. When the re-arrangement of the present retort-benches is completed, the carbonizing plant will consist of 18 retorts, capable of dealing with 9 tons 4 cwt. of coal per 24 hours, and will be equal to a daily output of about 94,000 cubic feet of gas. Mr. Hill does not anticipate that it will be necessary to make any further extensions of the carbonizing plant for at least four or five years. The purifying apparatus consists of a Livesey washer-scrubber (35 feet high by 4 ft. 6 in. diameter) and four purifiers (7 feet square); but the provision of additional power in this respect will have to be considered shortly. There is ample storage accommodation for some years; the two holders having a total capacity of 218,000 cubic feet. The station meter and governor are practically new; and the former is capable of registering 200,000 cubic feet per 24 hours. The make of gas has almost trebled since the works were acquired. Mr. Hill, in his report, adduced a number of figures to make clear to the Committee that they were in a position to reduce the price of gas to ordinary consumers by 10d. per 1000 cubic feet, and allow 10 per cent. discount to large consumers; making a total reduction of £308. The report was considered at a meeting of the Council on the 9th inst., when it was resolved to reduce the price from 5s. to 4s. 2d. per 1000 cubic feet to ordinary consumers, with the usual discount of 10 per cent., making it 3s. 9d. net; to allow an extra 10 per cent. from the charge for gas supplied to engines, cooking-stoves, &c., making it 3s. 4d. net; and also to allow large consumers 10 per cent. off the present price—viz., 3s. 3d.—which is equal to a reduction of nearly 4d. per 1000 cubic feet. These concessions will take effect from the 1st prox.

Water-Works Extensions at Widnes.—The Gas and Water Committee recommended the Widnes Town Council on Tuesday last to approve of a report by Mr. Carr with reference to the provision of duplicate plant at Stocks Well, at an estimated cost of £12,000, and to instruct that the necessary plans be prepared. The Committee also advised that a new surface condenser be constructed at Stocks Well, in place of the present cooling-pond, at a cost of £250. In moving the adoption of the minutes, Alderman Timmis observed that the maximum pumping capacity at Netherley was 2,500,000 gallons per diem, and at Stocks Well 1,600,000 gallons; making a total of 4,100,000 gallons. The present maximum supply per diem was 3,342,937 gallons. This left them with a margin of 758,000 gallons, which was a very fair one indeed; but, at the present time, only 900,000 gallons per day were being pumped at Stocks Well, instead of 1,600,000 gallons, so that the margin was reduced to about 58,000 gallons. The recommendations were adopted.

The Liverpool Water Engineer and his Salary.—By 27 votes to 12, Mr. Joseph Parry, the Water Engineer of the Liverpool Corporation, has had his salary raised from £1000 to £1200 a year. At last Wednesday's meeting of the Liverpool City Council, the Chairman of the Water Committee (Alderman T. Hughes) moved a resolution to that effect. He said that at no time had the Committee been doing their work at so little cost as at present. Mr. Parry never spared himself; and night and morning he devoted himself to the work of the Corporation, having no regular hours. Alderman Hughes alluded to the enormous responsibilities resting upon Mr. Parry's shoulders, and said that not a week passed without his visiting the Vyrnwy, Rivington, and home works. In Mr. Parry they had a Water Engineer who was second to none in the kingdom; and his modesty in not pushing forward his claims ought to be no reason for allowing his services to go unrewarded. Some adverse discussion of the proposal followed, in reply to which Alderman Hughes stated that Mr. Parry's duties were continually increasing. There was hardly a week in which they did not get applications from outside authorities for a water supply—the previous day they had three such applications. This meant increased work for their Engineer; but beyond that still more important works loomed in the future. They must all look forward to the time when they would have to put down a second line of pipes from Vyrnwy; and there was also the question of impounding the water of two rivers in proximity to Vyrnwy Lake.

The New Water Scheme for Shrewsbury.—For forty years the Shrewsbury Town Council have been endeavouring to grapple with the question of water supply; and, as already announced in the JOURNAL, they have before them a scheme prepared by Messrs. John Taylor, Sons, and Santo Crimp, which seems to have met with much approval, but which the Council hesitate to adopt without first of all obtaining the approval of those who will have to bear the expense. Instructed by the Water Committee, therefore, the Town Clerk (Mr. H. C. Clarke) has issued voting papers to all ratepayers and property owners in the borough, asking for an expression of opinion for or against the scheme. In an explanatory statement accompanying: he paper, it is urged that the present supply from the river and the state of the mains, are both bad, and render it absolutely necessary that steps should be immediately taken to provide an adequate and improved supply. The intake from the river for the new scheme will be near Shelton; and there will be a pumping-station, subsiding tanks, and filter beds just within the borough boundary. The covered service reservoir will be north of the town, and 108 feet above the highest ground level. The water will be "as good as that of any town in England supplied from a river, and will be suitable for every use." The estimated cost is £48,000; and the expenditure will necessitate the addition of a 1¼d. in the pound on the present water-rate of 1s. 2¼d. A somewhat similar river scheme was "floored" by a town's meeting some years ago; and since then an upland scheme has been brought forward, but met with a similar fate in a *plebiscite*, like the present, which took place to ascertain the views of the public on the subject. It may be added that the present supply of river water is not used for drinking purposes; and the voting paper explains that this supply will not be dispensed with, but improved, even if the new scheme is adopted.

The Purchase of the Odessa Water-Works by the Municipality.—An extraordinary meeting of the Odessa Water Company was held last Wednesday, to consider resolutions (1) for selling the Company's concession to the Municipality of Odessa, and (2) for winding up the Company with a view to distributing the proceeds of the sale. Sir Peter Spokes, in moving the first resolution, stated that the proposals for acquiring the undertaking by the Municipality were practically the same as those which were submitted to the shareholders at the annual meeting on April 29 last. The position, however, was simply this—that at the last meeting the Directors thought that the terms offered by the authorities meant 20 years' purchase of £20,000 a year, producing a round sum of £400,000, *plus* the value of the meters, stores, &c.; whereas it was now made clear to them by the protocol of the Commission which had inquired into the subject, and by the letter of the Chairman of the Commission addressed to Mr. Platts (the Company's Agent and Manager in Odessa), that the offer made to them was to purchase, on a 5 per cent. table, an annuity having 27 years' run of 200,000 roubles per annum, which would produce, not £400,000, but something under £300,000. Mr. Blunt was therefore right in the interpretation which he placed last April upon the offer; and he (the Chairman) and his colleagues were there that day to make this admission, and to advise the shareholders to accept the terms of purchase formulated by the protocol under date of July 20 last. The Directors could not see their way to advise the shareholders to embark any more capital in the undertaking; and they therefore thought that it would be wise to accept the offer now submitted as a fair solution of the difficulties between the city and the Company, and regard it rather in the nature of a compromise, by which neither party would get all it thought it was entitled to. Mr. Goodsall seconded the motion. An amendment was proposed for adjourning the meeting; and a second in favour of accepting an annuity instead of a lump sum. Both were rejected; and the original motion was agreed to. A resolution winding up the Company voluntarily, and appointing the Directors liquidators, was also adopted.

Storage Extensions at the Birkenhead and Middlesbrough Corporations' Gas-Works.—We learn that Messrs. Ashmore, Benson, Pease, and Co., of Stockton-on-Tees, have finished the enlargement of a holder at the Birkenhead Gas-Works, by the addition of two lifts working on the Pease rope system. The holder has now four lifts, 160 feet diameter, by 30 feet deep; the two lower ones being controlled by columns, &c. In the course of a few days, a still larger holder will be working at Middlesbrough. It will consist of a steel tank, 184 feet in diameter, standing on the ground level, and three lifts (30 feet deep), guided on the rope system.

The Leeds Water-Works Extensions.—The Water Committee of the Leeds Corporation last Friday further considered the high-level gravitating scheme, which is to do away with the cost of pumping to the higher levels in the district. The proposal is to make one or two new reservoirs in the Washburn Valley above Thruscross, the total capacity of which would be 1715 million gallons, and the water area 168 acres. The construction of this additional storage accommodation is a matter of necessity not very remote, because, even if begun at once, the reservoirs would, of course, take some years to construct; and the city, increasing at its present rate, would be in need of the extra supply by the time they were completed. It was resolved that a Sub-Committee should make inquiries before taking parliamentary action.

Morley New Water-Works.—Included in the report submitted by the Water Committee at the last monthly meeting of the Morley Town Council, was a letter from the Water Engineer (Mr. C. Gott) with reference to the contracts for the water-works at Withens Clough. The total cost of the whole of the works of the reservoir and north and south conduits was £49,820, of which amount £47,700 had already been paid, leaving the final balance now due. He had dealt with the whole of the claims of the Contractors, and considered that the settlement was in every way satisfactory. His original estimate for these works was £45,903; and the excess of expenditure was £3917, which covered the additional cost of the removal of peat, the wing puddle trenches, the pitching of the inner slopes, and all extra works. The reservoir has a capacity of 30 million gallons larger than the original design.

Carlisle Corporation Gas and Water Accounts.—The annual report and accounts of the Carlisle Corporation Gas and Water Committee (which were noticed last week) were submitted for adoption by Alderman R. Foster at last Tuesday's meeting of the Town Council; and, in addition, he proposed that £7325, the balance of profits from the gas-works, be transferred to the city fund, and £4565, the balance of profits from the water-works, to the district fund. He intimated, in the course of his remarks, that, in view of the extension of buildings in the city, and the increase in the consumption of water, it would be necessary at no distant date to spend some money upon obtaining an adequate supply either by increasing the present pumping power or getting a supply by gravitation. In seconding the motion, Mr. Corbett mentioned that the penny-in-the-slot meter system had been largely taken advantage of; the number of consumers being now 1200. The consumption of gas was now so great that he believed, in the course of two or three years, it would be necessary to make extensions at the gas-works. In answer to questions, it was explained that the sums handed over to the city and district funds represented gross profits. Mr. White stated that there was £3460 to be paid out of the £7300 gas profits for interest, &c., and £2518 out of the £4500 water profits. In two years' time, they would be much relieved as regarded loans. The motion was carried.

The Kent Water Question.—The Chairman of the Bromley Urban District Council has forwarded a letter to the London County Council, with reference to the Bills promoted in Parliament for the acquisition of water-works in Kent. In the course of the letter, the Council are asked if their Bills are merely suspended, or whether new Bills will be introduced; and the writer then continues: "I have also to ask you to be good enough to let me know whether the London County Council, in the event of their proceeding with the old Bill, or introducing a new one, will be prepared to consider favourably a proposal that the several Kent authorities interested in the matter shall be at liberty to acquire, through the London County Council, or from the Kent Water-Works Company direct, that portion of the undertaking which is situate outside the Metropolitan area, subject, of course, to arrangements being made which shall be satisfactory to both parties, for the control of the sources of supply situate outside the Metropolitan area. If some satisfactory arrangements in this direction could be made before next session, I presume that the London County Council would not object to the Kent authorities promoting a Bill to enable them to acquire the portion of the undertaking I have referred to, such Bill to run concurrently with, and be considered by, the same Parliamentary Committee as your own Bill." The London County Council now being in recess, the letter has only been formally acknowledged.

The Accounts of the Halifax Corporation.—The Borough Accountant of Halifax (Mr. James Nicholl) has issued his abstract of accounts for the year ending March 31 last. It gives, in convenient tabular form, the leading figures of the various Corporation departments for the past three years. With regard to the Gas Department, it is shown that the total income for last year was £84,623; for 1893-4, £85,508; and for 1892-3, £77,150. The total expenditure was £78,131, £85,281, and £73,513 respectively. The Water Department produced, in 1894-5 £46,051; in 1893-4, £85,508; and in 1892-3, £77,150—the expenditure being £40,388, £39,837, and £38,194. The income of the Electric Lighting Department last year was £571; and the expenditure, £1661. The total capital expenditure on the electric lighting works is entered at £35,449.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

(For Stock Market Intelligence, see ante, p. 578.)

Issue.	Share	When ex-Dividend.	Dividend or Div. & Bonus.	NAME.	Paid per Share	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.				£ s. d.
590,000	10	10 Apl.	10½	Alliance & Dublin 10 p. c.	10	23½–24½	..	4 5 8
100,000	10	,,	7½	Do. 7 p. c.	10	16–17	..	4 8 3
300,000	100	1 July	5	Australian (Sydney) 5 % Deb.	100	107–109	–1	4 11 9
200,000	5	1 May	6½	Bombay, Limited	5	7⅞–7⅞	+⅛	4 3 10
40,000	5	,,	6½	Do. New	4	5¾–5¾	+⅛	4 10 3
380,000	Stck.	14 Aug.	12	Brentford Consolidated	100	253–258	..	4 13 0
180,000	,,	,,	9	Do. New	100	200–210	..	4 5 8
220,000	Stck.	14 Mar.	11	Brighton & Hove Original	100	227–232	..	4 14 10
933,500	Stck.	29 Aug.	5	Bristol	100	125–130	..	3 16 11
320,000	20	28 Mar.	11½	British	20	54–56	..	4 0 4
50,000	10	29 Aug.	11½	Bromley, Ordinary 10 p. c.	10	21½–22½	..	5 2 2
51,510	10	,,	8½	Do. 7 p. c.	10	16½–17½	..	4 17 1
328,750	10	12 June	4	Buenos Ayres (New) Limited	10	7¾–8¼	..	4 14 1
200,000	100	1 July	6	Do. 6 p. c. Deb.	100	101–104	..	5 15 5
150,000	20	11 July	8½	Cagliari, Limited	20	31–33	..	5 0 0
550,000	Stck.	10 Apl.	13½	Commercial, Old Stock	100	300–305	..	4 8 6
165,000	,,	,,	10½	Do. New do.	100	225–230	..	4 11 4
160,762	,,	12 June	4½	Do. 4½ p. c. Deb. do.	100	143–147	..	3 1 3
800,000	Stck.	12 June	13	Continental Union, Limited.	100	270–280	..	4 12 10
200,000	,,	,,	10	Do. 7 p. c. Pref.	100	207–212	..	4 14 4
535,000	Stck.	29 Aug.	5½	Crystal Palace Ord. 5 p. c. Stk	100	125–130	..	4 0 9
486,090	10	26 July	11	European, Limited	10	25–26	..	4 4 7
351,060	10	,,	11	Do. Partly paid	7½	17–18	..	4 14 3
5,616,590	Stck.	14 Aug.	12⅝	Gaslight & Coke, A, Ordinary	100	297–300	+4	4 5 0
100,000	,,	,,	4	Do. B, 4 p. c. max.	100	107–112	..	3 11 5
665,000	,,	,,	10	Do. C, D, & E, 10 p.c. Pf.	100	280–285	..	3 10 2
30,000	,,	,,	5	Do. F, 5 p. c. Prf.	100	130–135	..	3 14 1
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	100	197–202	..	3 14 3
1,300,000	,,	,,	7	Do. H, 7 p. c. max.	100	192–197	+5	3 11 1
463,000	,,	,,	10	Do. J, 10 p. c. Prf.	100	277–282	..	3 10 10
476,000	,,	,,	6	Do. K, 6 p. c. Prf.	100	163–168	..	3 11 5
1,061,150	,,	12 June	4	Do. 4 p. c. Deb. Stk.	100	131–134	..	2 19 9
294,850	,,	,,	4½	Do. 4½ p. c. do.	100	140–145	..	3 2 1
908,000	,,	,,	6	Do. 6 p. c. do.	100	202–207	..	2 17 11
3,800,000	Stck.	10 May	12	Imperial Continental	100	249–254	+1	4 14 5
75,000	5	26 June	6	Malta & Mediterranean, Ltd.	5	5¼–6¼	..	4 16 0
560,000	100	1 Apl.	5	Met. of Melbourne, 5 p.c. Deb.	100	115–117	..	4 5 6
541,920	20	12 June	5	Monte Video, Limited	20	17½–18½	..	5 8 1
150,000	5	24 May	8	Oriental, Limited	5	7¼–7⅞	..	5 3 2
60,000	5	12 Sept.	7	Ottoman, Limited	5	5–5½*	+⅛	6 7 3
166,870	10	14 Feb.	2	Para, Limited	10	1½–2½	..	8 0 0
420,000	100	2 May	6	People's Gas of Chicago—1st Mtg. Bds.	100	102–106	..	5 13 2
500,000	100	4 June	6	2nd Do.	100	100–105	..	5 14 3
150,000	10	26 Apl.	7	San Paulo, Limited	10	10¾–11½	+⅛	5 1 9
500,000	Stck.	29 Aug.	15½	South Metropolitan, A Stock	100	360–370	..	4 3 9
1,350,000	,,	,,	12	Do. B do.	100	305–310	+3	3 17 5
308,685	,,	,,	13	Do. C do.	100	315–325	..	4 0 0
800,000	,,	11 July	5	Do. 5 p. c. Deb. Stk.	100	174–177	..	2 16 6
60,000	Stck.	12 Sept.	11½	Tottenham & Edm'nton, "A"	100	230–235*	+5½	4 17 10
				WATER COMPANIES.				
746,021	Stck.	26 June	10	Chelsea, Ordinary	100	290–295	..	3 7 10
1,719,514	Stck.	10 Apl.	8	East London, Ordinary	100	225–229	+1	3 9 10
654,740	,,	26 June	4½	Do. 4½ p. c. Deb. Stk.	100	157–162	..	2 15 6
700,000	50	26 June	7	Grand Junction	50	117–122	..	2 17 5
708,000	Stck.	29 Aug.	12	Kent	100	303–308	..	3 17 11
1,043,800	100	26 June	7½	Lambeth, 10 p. c. max.	100	258–263	..	2 17 0
406,200	100	,,	7½	Do. 7½ p. c. max.	100	208–213	..	3 10 5
330,000	Stck.	28 Mar.	4	Do. 4 p. c. Deb. Stk.	100	145–150	..	2 13 4
500,000	100	14 Aug.	12⅘	New River, New Shares	100	385–395	..	3 2 9
1,000,000	Stck.	26 July	4	Do. 4 p. c. Deb. Stk.	100	143–148	..	2 14 2
902,300	Stck.	12 June	4	S'thwk & V'xhall, 10 p.c. max.	100	150–155	..	2 11 8
126,500	100	,,	4	Do. D 7½ p.c. do.	100	140–145	..	2 15 2
1,155,066	Stck.	12 June	10	West Middlesex	100	290–295	..	3 7 10

*Ex div

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale in the United Kingdom than all other Oxides combined. Purity and uniformity of quality guaranteed. Pamphlet, "How to Purchase Bog Ore," to be obtained on application.

JOHN WM. O'NEILL, Managing Director,
Palmerston Buildings, Old Broad Street, London, E.C.

ANDREW STEPHENSON, AGENT. All communications re Oxide to be addressed to Palmerston Buildings.

WINKELMANN'S "VOLCANIC" CEMENT. Fire Resistance up to 4500° Fahr. In use in most Continental Gas-Works, and in more than 300 British Gas-Works

ANDREW STEPHENSON,
182, GRESHAM HOUSE,
OLD BROAD STREET,
LONDON, E.C.

Telegrams: "Volcanism, London."

W. C. HOLMES & CO., Huddersfield, AND 80, CANNON STREET, LONDON,
Contractors for Gas-Works complete, Makers of Gasholders, Purifiers, Scrubbers, Condensers, Retort Fittings, &c., Improved Valves, Engines, and Exhausters. Also Improved Patent Rotary Scrubber-Washers.
*** See Advertisement p. II., centre of JOURNAL.
Cablegrams: "Ignitor London." Telegrams: "Holmes Huddersfield."

J. & J. BRADDOCK, Globe Meter Works, Oldham.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Address: "Braddock Oldham."

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Limited, Chemical Works, Leeds, specially produce this ACID from BRIMSTONE, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

GAS PURIFICATION.

OXIDE OF IRON BOG ORE.

BALE & CO.'S Oxide of uniform quality. Sample and Price on application.
OXIDE PAINTS, OILS, SULPHURIC ACID, &c.
120 and 121, NEWGATE STREET, LONDON, E.C.
Telegrams: "BOGORE, LONDON."

OXIDE OF IRON.

FINEST Quality of Natural Bog Ore. Particulars and price, apply to Mr. T. L. ARCHER 20, Fennel Street, MANCHESTER.

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for, Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings, at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
Telegraphic Address: "PORTER LINCOLN."

GWYNNE & BEALE'S
PATENT GAS EXHAUSTERS AND ENGINES.

Telegrams: "GWYNNEGRAM, LONDON." Telephone No. 2698.

GWYNNE & CO.,

HYDRAULIC AND GAS ENGINEERS,

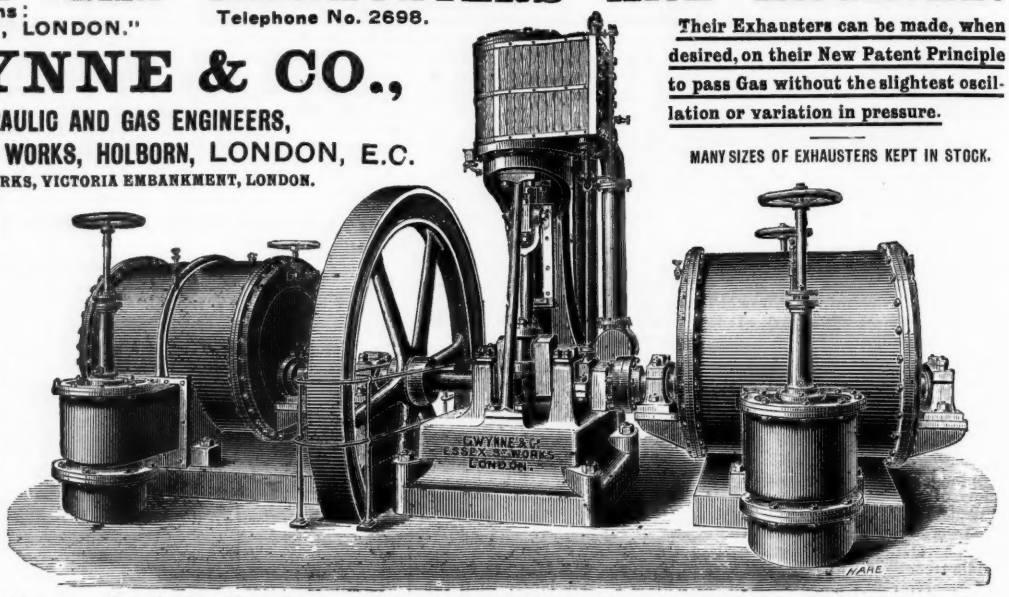
BROOKE STREET WORKS, HOLBORN, LONDON, E.C.

Late ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON.

They have completed Exhausters to the extent of 32,000,000 cubic feet passed per hour, which are giving unqualified satisfaction in work.

Makers of GAS-VALVES, HYDRAULIC REGULATORS, VACUUM GOVERNORS, PATENT RETORT-LIDS, STEAM-PUMPS for Tar, Liquor, or Water; CENTRIFUGAL PUMPS and PUMPING ENGINES, specially adapted for Water-Works, raising Sewage, &c.

Also GIRARD and other TURBINES, HIGH SPEED ENGINES, DYNAMOS, &c., &c., for ELECTRIC LIGHTING.



Their Exhausters can be made, when desired, on their New Patent Principle to pass Gas without the slightest oscillation or variation in pressure.

MANY SIZES OF EXHAUSTERS KEPT IN STOCK.

Exhausting Machinery at Fulham and Bromley Gas-Works, London—each set passing 400,000 cub. ft. per hour drawing 14 miles distant from Beckton.

Catalogues and Testimonials sent on application.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of PERMANENT ADVERTISEMENTS, should be received not later than the FIRST POST on SATURDAY.

AMMONIACAL LIQUOR Wanted.
BROTHERTON AND Co., Ammonia Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

GAS TAR Wanted.
BROTHERTON AND Co., Tar Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SPENT OXIDE Wanted.
BROTHERTON AND Co., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

BROTHERTON & CO.
Offices: Commercial Buildings, LEEDS. Correspondence invited.

JOHN RILEY & SONS, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of SULPHURIC ACID, from Brimstone, for Sulphate of Ammonia making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol. References given to Gas Companies.

PATENTS FOR INVENTIONS.

J. C. CHAPMAN, M.I.M.E. and Fel. Chartered Inst. Patent Agents. ADVICE ON ALL MATTERS CONNECTED WITH ABOVE. Information and Handbook on application. 70, CHANCERY LANE, LONDON, W.C.

BACK-PRESSURE IN PURIFIERS.

THE Valve invented by Mr. Cripps for Bye-Passing any Layer of Purifying Material referred to by the President of the Incorporated Institution of Gas Engineers in his Inaugural Address) can be obtained of the Makers: C. & W. WALKER, Midland Iron-Works, Donnington, near Newport, SALOP, and J. EVERY & SON, Phœnix Iron-Works, LEWES, to which Firms all inquiries should be addressed.

HYDRATED OXIDE OF IRON.

PREPARED from pure Iron.
Two or three times as rich as Bog Ore.
Strong action on Sulphuretted Hydrogen.
To be used alone, but will increase activity of other Oxides.
Less than half the price of Bog Ore.
Can be lent on hire.
Write for tabulated results.
READ HOLLIDAY AND SONS, LIMITED, HUDDERSFIELD.

WANTED, a Situation as General FITTER and INDEX TAKER. First-class Testimonials.
Address No. 2562, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

SITUATION wanted by Advertiser. Good Sulphate of Ammonia, Benzol, and Solvent Naphtha Maker; also certificated Engine Driver, Sixteen years' good character. Age 39.
Address No. 2566, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

SPECIAL PAINT FOR GAS-WORKS.

JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS, MANCHESTER.
Telegrams: "ENAMEL." National Telephone 1759.

GAS PLANT CEMENT.

JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS, MANCHESTER.
For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

SULPHATE OF AMMONIA SATURATORS.

WALTER THOMASON and SONS, Chemical Plumbers, &c., and Makers of Lead Saturators, &c., 21, WESTON STREET, BOLTON. Repairs of every description.
Please write for Estimate before ordering elsewhere.

SADLER AND CO., LIMITED, MIDDLESBROUGH; ULVERSTON (BARROW); PORTSMOUTH; CARLTON; STOCKTON; 315, St. Vincent Street, GLASGOW; and 85, Water Street, NEW YORK. Tar Distillers, Manufacturers of all TAR PRODUCTS, ALIZARINE and other TAR COLOURS, BICHROMES, OXALIC ACID, ALKALIES, LIQUOR AMMONIA, AMMONIA SULPHATE, &c.
Head Office MIDDLESBROUGH. Correspondence invited.

WANTED, a steady Man as leading STOKER. Must be a good Carbonizer, and competent to take charge of Engine and Exhauster, and have a good character.
Apply, stating Age, whether Married or Single, and Wages required, to J. H. TROUGHTON, Gas-Works, NEWMARKET.

USK GAS COMPANY, LIMITED.

WANTED, a competent Working MANAGER, to take charge of the Making and Distribution of Gas, take Meters, collect Accounts, and undertake all Fitting Work, including Mains and Services.
Salary, £100 per annum, with House, large Garden, Coal, and Gas free.
Applications (stating Age), with Testimonials, to be sent in to me on or before Saturday, the 28th inst.
H. A. ADDIS, Secretary.
Usk, Sept. 7, 1895.

WANTED, a Second-hand Scrubber or WASHER-SCRUBBER, having 8-inch or 10-inch Connections, to pass not less than 100,000 Cubic Feet per day; also a WASHER of similar capacity.
Give full Particulars and Price, put on Rail, to No. 2561, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

SULPHATE OF AMMONIA SATURATORS.

JOSEPH TAYLOR & CO., Chemical Plumbers, &c., and Makers of every description of Solid Plate Lead and Timber Cased Saturators, &c. CENTRAL PLUMBING WORKS, TOWN HALL SQUARE BOLTON. Special Attention to Repairs.
Before placing Orders, please write for Estimate.

THE Undersigned is in a position to supply, at the very lowest Prices, the most suitable kind of BENZOL for enriching Gas, made from Hardman's Patent Carbonization Process, of which I am the Sole Patentee. On application, I would furnish Price on the most reasonable terms; giving advice how to utilize it on the most economical method.
J. HARDMAN, Manufacturing Chemist.
Milton, Staffs.

TO ENGINEERS AND MANAGERS.

MR. J. L. FEATHERSTONE (late Chief Draughtsman to Humphreys and Glasgow) is prepared to supply complete WORKING DRAWINGS, SPECIFICATIONS, and QUANTITIES for WATER-GAS PLANT. Own design.
Also DRAWINGS, TRACINGS, &c., of COAL GAS PLANT; Specially prepared for work wanted in a hurry. Moderate Charges.
Temporary Offices: 27, FORE STREET, E.C.

TO GAS AND MECHANICAL ENGINEERS.

WANTED, a Partner in a Business which was established by the Owner about Fifty Years ago, and has been conducted by him ever since as Engineer, Contractor, and Manufacturer. A new departure is necessary; and he desires to have associated with him a clever, all-round Gas and Mechanical Engineer and good Man of Business, with a Capital of about £5000 to develop a Connection which is unique.
Address "ENGINEER," care of Messrs. J. Burbidge and Co., 62, MOORGATE STREET, E.C.

GAS COKE—3000 Tons for Sale, loaded into Trucks for Rail or Shipment.
Apply to H. MORLEY, Gas-Works, CARDIFF.

FOR SALE, Cheap—Two 600-Light Dry METERS, only just removed, in fair condition. No reasonable offer refused.
Apply to H.C.P., 18, Hand Court, HIGH HOLBORN, W.C.

TO BE SOLD, by Tender, the Gas Plant at Lockwood Mills, near Huddersfield, consisting of the FITTINGS of Eight Ovens, Eighteen HYDRAULIC MAINS, CAST-IRON CISTERN, WATER-TUBE CONDENSER, WROUGHT-IRON PLATE SCRUBBER (6 feet diameter, 12 feet high), one GAS-HOLDER (60 feet diameter and 20 feet deep), with all Fittings, two PURIFYING-BOXES (11 ft. by 5 ft. by 3 ft. 6 in.), STATION METER (800-light), and all Fittings to the same.
Detailed Particulars can be obtained from
B. STOCKS, Architect.
St. Peter's Street, Huddersfield.

FOR SALE—An Improved Rotary Gas EXHAUSTER, 5000 Cubic Feet per hour. Perfectly new.
Apply to SELLERS, PICKERING, AND CO., Ravensthorpe, YORKS.

CITY OF BELFAST.

CONTRACT FOR COAL.

THE Gas Committee of the Belfast Corporation invite TENDERS for the supply of 90,000 Tons of best screened GAS COAL, to be delivered free and trimmed in Barges at Belfast Harbour, between the 1st of November, 1895, and the 31st of October, 1896.
No Tender for less than 10,000 Tons will be considered.
Monthly Quantities and Particulars may be obtained from the Manager of the Gas-Works.
Tenders, on office forms, endorsed "Tender for Coal," should be delivered at my Office not later than the 2nd of October.
The lowest or any tender not necessarily accepted.
SAMUEL BLACK,
Town Clerk.

BOROUGH OF BEVERLEY.

TENDERS FOR COAL.

THE Gas Committee are desirous to receive TENDERS for the supply of COAL for a period of Twelve Months from the 1st of October next, to be delivered, as from time to time directed, by and at the expense of the Contractors, f.o.b. at Keadby, or at the Pits, or at the Railway Station, Beverley, according to the terms of contract.
The Coal to be of the best kind, well Screened, free from Sulphur, Bats, Bind, Refuse, and Dirt, and to be weighed (20 cwt. to the ton) upon the Corporation machine.
Payments will be made monthly, so long as the contract shall be duly fulfilled.
The Corporation do not bind themselves to accept the lowest or any tender.
Further Information may be obtained of the Gas Manager (Mr. James Gibson) at the Gas-Works, Beverley; and tenders, endorsed "Tender for Coal," must be delivered at my Office not later than Monday, the 23rd of September inst.
By order,
J. WILLIS MILLS,
Town Clerk.
Guildhall, Beverley,
Sept. 9, 1895.

TO TAR DISTILLERS AND OTHERS.

THE Directors of the Isle of Thanet Gas-light and Coke Company are prepared to receive TENDERS for from 150,000 to 160,000 Gallons (about) of TAR at their Works at Margate, to be delivered and taken between the 1st of October and the 15th of May next, in such quantities as may be arranged by the Company's Engineer.
The Tar will be pumped into Tanks or Barrels on the Company's Premises; but all other Costs, Dues, or Charges are to be paid by the Contractor, who must further undertake to do the Carting to the satisfaction of the Company's Engineer. And no question as to the quality or quantity of the Tar will be entertained after its removal from the Company's Works. This condition will be strictly adhered to.
Terms: Net Cash within 15 days of date of invoice.
Any further Information will be given on application to the Engineer and Manager of the Company, Mr. H. H. Jones.
Tenders to be sent in on or before Thursday, the 26th of September, addressed to the Chairman of the Company, and endorsed "Tender for Tar."
The Directors do not bind themselves to accept the highest or any tender.
By order,
THOS. C. FULLER,
Secretary.
Gas-Works, Margate,
Sept. 13, 1895.

COMMERCIAL GAS COMPANY.

NOTICE is Hereby Given, that an ORDINARY MEETING of the Commercial Gas Company will be holden at the Cannon Street Hotel, in the City of London, on Thursday, the 3rd of October, 1895, at Twelve o'clock at Noon, to receive the Directors' Report and the Accounts of the Company for the Half Year ended the 30th of June, 1895, and to declare a Dividend.
The STOCK TRANSFER BOOKS WILL BE CLOSED from the 20th of September inst. to the 3rd of October next, both days inclusive.
By order of the Board,
H. D. ELLIS,
Secretary.
Offices, Stepney,
Sept. 10, 1895.

SOUTHEND GAS COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors in this Company will be held at the Offices, No. 52, High Street, Southend, Essex, on Monday, the 23rd day of September next, at Two o'clock in the Afternoon precisely, to receive the Report of the Directors and the Statement of Accounts for the Half Year ended the 30th of June last, to declare Dividend, and for transacting General Business.
The TRANSFER BOOKS will be CLOSED from the 12th to the 23rd of September, both days inclusive.
By order of the Board,
JAS. T. RANDALL,
Secretary.
Offices of the Company:
No. 52, High Street, Southend-on-Sea,
Aug. 29, 1895.

BRITISH GASLIGHT COMPANY, LIMITED.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of this Company will be held at this Office on Wednesday, the 25th inst., at Half-past Twelve o'clock precisely, to transact the usual Business, to declare a Dividend for the Half Year ended the 30th of June last, and to elect two Directors and One Auditor in the place of those who go out by rotation, but who are eligible to be re-elected.
Notice is Hereby also Given, that the TRANSFER BOOKS of the Company WILL BE CLOSED on the 14th and RE-OPENED on the 26th inst.
By order of the Court of Directors,
FREDERIC LANE LINGING,
Secretary.
Chief Office: No. 11, George Yard,
Lombard Street, London, E.C.,
Sept. 4, 1895.

Fcap. 4to, Cloth, price 7s. 6d., post free.

Practical Photometry.

By William Joseph Dibdin, F.I.C., F.C.S.

LONDON: WALTER KING, 11, Bolt Court, FLEET STREET.

HUNTER'S

OXIDE OF IRON.

JAMES HUNTER, MINER, AND SHIPPER OF
NATURAL IRISH BOG ORE.

This Estate yields the finest and most uniform quality in Ireland; and the quality is guaranteed.

Samples and Prices on application.

5, PRINCES STREET, PORT GLASGOW.

Telegrams: "HUNTER, PORT GLASGOW."

Established 1872.

UNEQUALLED.

Gas Companies are solicited to try Samples of the

MIRFIELD
BLACK BED GAS COAL.

Prices and Analysis on application.

MIRFIELD (GAS-COAL) COLLIERY COMPY.

RAVENSTHORPE, NEAR DEWSBURY.

INCANDESCENT MATERIALS

OF THE VERY BEST QUALITY FOR

Lighting Power and Burning Permanence.

Recommended to Wholesale Buyers.

IN ANY QUANTITY.

Supplied by the

INTERNATIONALE GLÜHKÖRPER COMPAGNIE,

ARNHEIM, HOLLAND.

WRITE FOR SAMPLES.

PIPES, 2-in. to 8-in. PIPES, 2-in. to 8-in. PIPES.

MONIER-WILLIAMS & Co.

IRONFOUNDERS,

MIDDLESBROUGH.

LOW MOOR BLACK BED
GAS COAL.

YIELD OF GAS PER TON . 10,375 CUBIC FEET.
ILLUMINATING POWER . 17·50 SPERM CANDLES.
COKE . . . . . 75 PER CENT.

Prices, f.o.r. or f.o.b., on application to

GEORGE & JOHN HAIGH,

RAVENS LODGE AND CONYERS' COLLIERIES,

DEWSBURY.

A TRIAL IS RESPECTFULLY SOLICITED.

LONDONDERRY GAS COALS

FROM THE

MARQUIS OF LONDONDERRY'S COLLIERIES,

COUNTY OF DURHAM.

Available output up to 5000 tons per day.
Yield of Gas 11,000 cubic feet per ton of Coal as per analysis by
Mr. John Pattinson, F.C.S., F.I.S.

FOR PRICES AND PARTICULARS, APPLY TO

S. J. DITCHFIELD,

SEAHAM HARBOUR, COUNTY OF DURHAM.

NOTICE.

The Incandescent Gas-Light Company, Limited, Hereby Give Notice, that they only supply their Mantles subject to the following express Conditions, which are printed and pasted on each box:—

> "The Incandescent Gas-Light Company Limited, in supplying the Mantle contained in this box, grant a Limited License to the purchaser to sell or use the same on the express condition that neither the purchaser nor any other person into whose hands the same may come shall use or sell the said Mantle except in connection, or for use, with Burners sold or supplied by the Company; any other sale or use will amount to Infringement of the Company's Patents. The Company supply Mantles for the purpose of renewals at the nominal price of 1s. 3d., subject to the Conditions and Limitations above set forth."

In the case of *The Incandescent Gas-Light Company, Limited v. Cantelo*, **Mr. Justice Wills upheld the Validity of these Conditions and Limited License; and, in the course of his Judgment, said:—**

> The patentee has the sole right of using and selling the articles; and he may prevent anybody from dealing with them at all. Inasmuch as he has the right to prevent people from using them or dealing in them at all, he has the right to do the lesser thing—that is to say, to impose his own conditions. It does not matter how unreasonable or how absurd the conditions are. It does not matter what they are if he says at the time when the purchaser proposes to buy, or the person proposes to take a license: 'Mind I only give you this license on this condition;' and the purchaser is free to leave it or take it as he likes. If he takes it, he must be bound by the condition."

In the case of *The Incandescent Gas-Light Company v. Hirschfeld and Others*, **the Honourable Mr. Justice Romer certified that the Validity of the Plaintiffs' Patents was established. Infringers in future will be liable to costs as between Solicitor and Client.**

(Signed) **FAITHFULL & OWEN,**
Solicitors for the Incandescent Gas-Light Company, Limited.

HOLMSIDE GAS COALS.

PRESENT DAILY PRODUCE OVER 4000 TONS.

LATEST ANALYSIS:—

Yield of Gas Per Ton . . 11,205 Cubic Feet.
Illuminating Power, 16 7/10 Stand. Sperm. Candl.
Coke (of good & pure quality) 13¾ Cwt. Per Ton.
Sulphur . . . . A little over 1 Per Cent.
Ash . . . . . Under 1 Per Cent.
Tar . . . . . 163 Lbs. (Avoir.) Per Ton.
Ammoniacal Liquor 103 Lbs. (Avoir.) Per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR PELTON GAS COALS.

PRESENT DAILY PRODUCE AVAILABLE, 2500 TONS.

RESULTS OF DIFFERENT ANALYSES:—

Yield of Gas Per Ton . . 10,500 Cubic Feet.
Illuminating Power . 17 Stand. Sperm Candl.
Coke (of excellent quality) . 13½ Cwt. Per Ton.
Sulphur . . . . . 1·13 Per Cent.
Ash. . . . . 1·34 Per Cent.
Tar. . . . . 180 Lbs. (Avoir.) Per Ton.
Ammoniacal Liquor 94½ Lbs. (Avoir.) Per Ton.

The HOLMSIDE and SOUTH MOOR COALFIELD possesses *a very great quantity of the best Coal;* and, whilst other Coal-Fields are becoming exhausted, this one is only being opened out, so that *the quality* of both the HOLMSIDE COALS, and the SOUTH MOOR COALS *may be relied upon for all practical purposes.*

These Coals may be bought through the Principal Merchants in England, or direct from

MR. MARK ARCHER,
HOLMSIDE AND SOUTH MOOR OFFICES,
NEWCASTLE-UPON-TYNE.

ECONOMIZE £16 per RETORT per ANNUM by the USE of RETORTS of REDUCED THICKNESS fitted with

GUEGUEN'S COMPENSATING HELICOIDAL RIBS.

NO OUTLAY OF CAPITAL.
NO ALTERATION IN SETTINGS.
APPLICABLE TO ALL RETORTS.

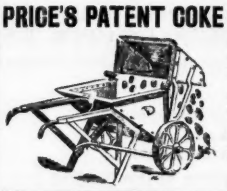
J. LANS,
Engineer,
10, MOORGATE STREET,
LONDON, E.C.

Inquiries from Retort Makers will be Esteemed.

A FREE TRIAL FOR ALL.
Agents Wanted.

THOMAS TURTON
AND SONS, LIMITED,
SHEAF WORKS, SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS.
SCREW STOCKS, TAPS AND DIES,
SPANNERS, RATCHET BRACES, LIFTING JACKS,
ANVILS, VICES,
AND ENGINEERS' TOOLS GENERALLY.
LONDON OFFICE:
90, CANNON STREET, E.C.

PRICE'S PATENT COKE & COAL BARROW



effecting a great saving of time, labour, and expense.
For Particulars, Price, &c., apply to Mr. E. PRICE, Inventor and Patentee, 119, Queen's Road, FINSBURY PARK, N.

Prices are Reduced.

BOLDON GAS COALS.
Worked by THE HARTON COAL CO., LTD.
Output about 3000 tons per day.

ANALYSIS—

Yield of Gas per ton . .	10,500	Cubic Feet.
Illuminating Power . .	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

Boldon Gas Coals are supplied under contract to

The Gaslight and Coke Company, South Metropolitan Gas Company, Commercial Gas Company, Imperial Continental Gas Association, European Gas Company, L'Union des Gaz (the Continental Union Gas Company), Crystal Palace District Gas Company, Danish Gas Company, Bombay Gas Company, San Paulo Gas Company, Alliance and Dublin Consumers' Gas Company, Ipswich Gaslight Company, Newcastle Gas Company, Sunderland Gas Company, South Shields Gas Company, and to many other Companies at Home and Abroad.

For prices, &c., apply to the

HARTON COAL COMPANY,
LIMITED,
Newcastle-on-Tyne.
W. H. PARKINSON,
FITTER.

THE "SIMPLEX" CARBURETTER
W. E. PRICE'S PATENT.

A New and Perfect Method of Enriching Gas in large or small quantities at a Moment's Notice.

Extract from H. LEICESTER GREVILLE'S Report:—

"I was much impressed with the simplicity of your apparatus, more especially as it satisfies the special requirements which I have always considered as most essential in carburetting—viz., the exposure of as large an area as possible within a given space for the vaporization of the Hydrocarbon used, and the introduction at the same time of a proportion of the Gas to be enriched over the surface of the liquid material."

Special Features of the "SIMPLEX"—

SIMPLICITY, PERMANENCE OF RESULTS, CHEAPNESS, AND ENTIRE ABSENCE OF CONDENSATION.

For Prices and further Particulars, apply to the Manufacturers,

GIBBONS Bros., Ltd., DUDLEY.

TROTTER, HAINES, & CORBETT,

Brettell's Estate

FIRE-CLAY & BRICK WORKS,

STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Proprietors of
BEST GLASSHOUSE POT & CRUCIBLE CLAY.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

NEWBATTLE CANNEL.

Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO

THE LOTHIAN COAL COMPANY,
LIMITED,
NEWBATTLE COLLIERIES,
DALKEITH, N.B.

JAMES OAKES & Co.,

ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,

Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1¼ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with bolts, nuts and covers, and rendering leakage impossible.

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for

CANNEL & COAL.

TYNE

BOGHEAD CANNEL.

Yield of Gas per ton	13,155 cub. ft.
Illuminating Power	38·22 candles.
Coke per ton	1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	73·1 per cent.

For Prices and complete Analysis, apply to

THOS. W. DANCE & SONS,
COAL OWNERS, NEWCASTLE-ON-TYNE;
OR
E. FOSTER & CO.,
21, JOHN STREET, ADELPHI, LONDON W.C.

THORNLEY GAS COALS

WORKED BY THE

WEARDALE IRON & COAL Co., Ld.

OUT OF THEIR

THORNLEY AND WHEATLEY HILL COLLIERIES.

Analysis made by

Messrs. J. & H. S. PATTINSON, *May 28, 1895.*

Yield of Gas per Ton	10,500 Cub. Ft.
Illuminating Power	16·9 Candles.
Coke (of good quality)	67·5 per Cent.
Sulphur	0·58 „
Ash	2·73 „

For Price, &c., apply to the

WEARDALE IRON & COAL Co., Ld.
QUAYSIDE, NEWCASTLE-ON-TYNE.

ROBERT MARSHALL,
CANNEL COAL MERCHANT,
97, WELLINGTON STREET, GLASGOW.

Prices and Analysis of all the Scotch Cannels on Application.

THE DRUM

FOR PUMPING AIR, WATER, SEMI-FLUIDS, &c.
See Advertisement in last and next issue.

HEBBURN MAIN GAS COALS.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·4 candles.
Coke	68 per cent.

For prices, f.o.b. Ship or Delivered by Rail, apply to

THE WALLSEND & HEBBURN COAL COMPANY, LTD.,
B Lombard Street,
NEWCASTLE-ON-TYNE.
W. RICHARDSON, Fitter.

THE SILICA FIRE-BRICK COMPANY,

OUGHTIBRIDGE, near SHEFFIELD,
MANUFACTURE

SILICA BLOCKS, BRICKS, AND CEMENT

OF SUPERIOR QUALITY
FOR GAS-FURNACES.

Trade Mark: "SILICA."

These Goods (largely used in Gas, Glass, Iron, and Steel Works) are, on account of their

GREATER DURABILITY,

Strongly recommended where EXCESSIVE HEATS have to be maintained.

KENT'S THICK GAS COAL

RAISED AT

The Wharncliffe Woodmoor Colliery,
BARNSLEY.

Yield of Gas, nearly 12,000 *Cubic Feet per ton of Coal; and Illuminating Power nearly* 17½ *Candles.*

The following is a complete ANALYSIS made by Mr. R. O. PATERSON, C.E., Gas-Works, Cheltenham:—

Specific Gravity (Water 1)	1·276
Weight of One Cubic Foot	79·700 lbs.

PROXIMATE ANALYSIS.

Moisture in Coal	2·68 per cent.
Volatile Matter	35·60 „
Fixed Carbon	58·80 „
Sulphur	0·96 „
Ash	1·96 „

COMMERCIAL ANALYSIS.

Gas per Ton of Coal	11,760 cub. feet.
Gas per Cubic Foot of Coal	418 „
Illuminating Power	17·44 candles.
Value of One Cubic Foot in Sperm	418 grains.
Value per Ton of Coal in Sperm	703 lbs.
Coke per Ton of Coal	1367 „
Coke	61·05 per cent.
Ash in Coke	3·21 „
Sulphur Eliminated with Volatile Products per Ton of Coal	9·4 lbs.
Sulphur in Coke per Ton of Coal	12 „
Ammoniacal Liquor per Ton of Coal	19·7 galls.
Tar per Ton of Coal	12·2 „

R. O. PATERSON, C.E.

Gas-Works, Cheltenham, 8th August, 1894.

For Price, &c., apply to the

Wharncliffe Woodmoor Colliery Co
LIMITED,
BARNSLEY;
Or to Mr. W. H. HARVEY,
17, Old Queen Street, Westminster, S.W.

BRAY'S PATENT "ENAMEL"

GAS-BURNERS

BRAY'S

"SPECIAL" & "ADJUSTABLE" BURNERS

Are the Best for General Use, and will, at their

REDUCED PRICE,

Save their Cost in Gas alone in Forty Hours' use.

The "Adjustables" are specially adapted for use with Penny-in-the-Slot Meters, for which purpose large quantities have been sold.

THE "CODAC" ECONOMISER.

Ordinary Regulator Burner with "Codac" Top on.

A cheap adaptation of Bray's "ADJUSTABLE" BURNER, not so efficient, but acceptable for some purposes. The top part only is required, and is made merely to slip on to our ordinary Regulator Burners, which are in use throughout the world. Made in Union Jets and Batswings.

Ordinary Regulator Burner with "Codac" Top on.

SEND FOR PRICE LIST AND CATALOGUE.

GEO. BRAY & Co., Gas-Lighting Engineers, LEEDS.

WILLEY & CO.,

GAS ENGINEERING CONTRACTORS,

EXETER,

For **GASHOLDERS** and all kinds of **ENGINEERING APPARATUS.**

For **WET** and **DRY GAS CONSUMERS' METERS.**

For **COIN METERS,** their Patent Automatic is admitted to be one of the best and most reliable in the Market. Largely used in the Metropolis.

For **GAS-FITTINGS,** Registered Designs in Extensive Variety.

Manufacturers of the **LIVESEY WASHER.**

Agents for the **MAXIM CARBURETTOR.**

New Works, 5 acres in extent, recently opened in the City of Exeter for the Manufacture of every kind of Apparatus used in the Production, Distribution, and Sale of Gas.

Telephone 132. **Telegraphic Address: "Willey, Exeter."**

ESTABLISHED 30 YEARS.

ALEX. C. HUMPHREYS, M.Inst.C.E. A. G. GLASGOW, M.E.

MESSRS. HUMPHREYS & GLASGOW

Have constructed their EUROPEAN type of

CARBURETTED WATER-GAS PLANT

At the following Gas-Works:—

Copenhagen	700,000 Cub. Ft.	Brussels	700,000 Cub. Ft.
Belfast	1,700,000 ,,	Liverpool	2,500,000 ,,
Glasgow	300,000 ,,	Tottenham	600,000 ,,
Santiago	400,000 ,,	Brighton	1,250,000 ,,

And have now under Contract:—

Belfast (Second Contract)	3,500,000 Cub. Ft.	Manchester	3,000,000 Cub. Ft.
Swansea	700,000 ,,	Bath	1,000,000 ,,
Preston	1,500,000 ,,	New York	1,000,000 ,,
Southport	750,000 ,,	Newburgh	350,000 ,,

In addition to which the previous Installations of The Gaslight and Coke Company under this System have a total capacity of 10,000,000 cubic feet per diem.

9, Victoria Street, London, S.W. Telegrams: "EPISTOLARY, LONDON." *United States Office, 64, Broadway, New York.*

JAMES MILNE & SON, LTD.,

GAS ENGINEERS,

MILTON HOUSE WORKS, EDINBURGH.

LONDON. — GLASGOW. — LEEDS.

W. E. SANDER,

COMMISSION AGENT, BERLIN, 41, FRIEDRICH STR.

SPECIALITIES: Incandescent Lamp Burners and Mantles (with or without electric lighting from any distance, by button from the wall, etc.).

INCANDESCENT SPIRIT LAMPS.

Electro-technical Ware of all kinds.

IMPORT and EXPORT.

PETTIGREW'S PATENT

Sulphate of Ammonia Plant

ON THE CONTINUOUS SYSTEM

Is the newest in the Market, and is the outcome of practical experience in Sulphate Making.

Old Systems easily and cheaply converted.

ANY SIZE ERECTED COMPLETE AT HOME OR ABROAD.

Write for Particulars, Testimonials, and References to

GEO. PETTIGREW & Co.,

GAS AND CHEMICAL ENGINEERS,

MIDDLESBROUGH-ON-TEES.

BOWENS' Ltd. Successors,

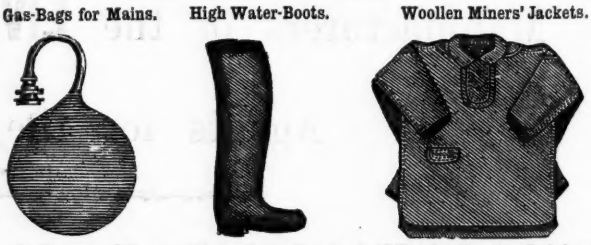
STOURBRIDGE.

MANUFACTURERS OF

BEST FIRE-BRICKS; INCLINED, HORIZONTAL, and SECTIONAL RETORTS; LUMPS, TILES, &c., of every description.

Established 1860.

Gas-Bags for Mains. High Water-Boots. Woollen Miners' Jackets.

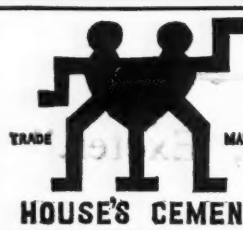


Delivery and Suction Hose, Gutta-Percha Acid Bottles, Leather Driving Bands, Woven Canvas Hose for Fire-Engines, Wedge and Square Gas-Bags, Air and Water Beds for Invalids, Oil Tarpauling Coats, Trousers, Hats, &c., Squeegees for cleansing Pavements, &c., Billiard and Bagatelle Cush, Tricycle Tyres, Leather Hose, Cotton Waste, Engine Cloths, Oils, &c., India-rubber Waterproof Garments for Walking, Driving, or Sporting Wear, Diving and Wading Dresses, Printers' Blankets, Iron Wheels and Rollers covered with India-rubber. Stokers' Gloves, 14s. 6d. per dozen.

Write for Price List to

THOMAS BUGDEN, Manufacturer,

71, GOSWELL ROAD, LONDON, E.C.



HOUSE'S CEMENT

USED BY 350 GAS-WORKS.

HOUSE'S JOINTING CEMENT

A Month's free trial.

For High Pressures, Cylinder Covers, Steam, Gas, and Water Socket and Flange Manholes.

1 cwt. equals 3 cwt. of RED LEAD.

& TANNIC COMPANY, LTD.,

The Ancient Philosophers thought and Cudgelled their Brains with

WHAT IS HOUSE'S TANNIC COMPO. "K.C."?

It will pay you to inquire when you want your Boilers cleaned and you suffer with incrustation.

NO CURE. NO PAY.

A Free Trial to Engineers, Gas Companies, and all Steam Users.

NORTH WORKS, RIPON.

A SCIENTIFIC INVENTION.

ABOUT HOUSE'S BELT DRESSING

Not made by Rule of Thumb.

Better Power and goes farthest, Cheapest and Best.

Free from Resin.

Send for Circular and Particulars for Black Belts.

1 Gallon does the same Work as 56 lbs. of other mixtures.

LONDON AGENTS:

Bale & Co., 120, Newgate Street, E.C.

WILLIAM INGHAM & SONS,

Incorporated with the Leeds Fire-Clay Company, Ltd.,

WORTLEY FIRE-CLAY WORKS

Near LEEDS,

Have confidence in drawing the special attention of GAS ENGINEERS to the following advantages of their Retorts:—

1. Smooth interior, preventing adhesion of Carbon.
2. They can be made in one piece up to 10 feet long.
3. Uniformity in thickness, ensuring equal Expansion and Contraction.

PATENT

MACHINE-MADE GAS-RETORTS.

GAS AND WATER PIPES

AND

CASTINGS OF EVERY DESCRIPTION.

MANUFACTURED BY THE

CLAY CROSS COMPANY,

CHESTERFIELD.

TRADE	TELEGRAMS:	LONDON OFFICE:
CXC	"JACKSON"	12, BURWOOD PLACE,
MARK.	CLAY CROSS.	W.

GODDARD, MASSEY, & WARNER'S

IMPROVED

Sulphate of Ammonia Apparatus.

The most successful and approved Apparatus known up to the present time.

FOR REFERENCES, PARTICULARS, TESTIMONIALS, AND PRICES, APPLY TO

GODDARD, MASSEY, & WARNER,

ENGINEERS,

NOTTINGHAM.

The Apparatus has been supplied to the following Firms—

BURT BOULTON, & HAYWOOD, SILVERTOWN, and ELING.
CHANCE BROTHERS, OLDBURY (Four Apparatus).
RUNCORN SOAP & ALKALI CO., Limited, RUNCORN.
NETHAM CHEMICAL CO., Limited, BRISTOL.
ANIMAL CHARCOAL CO., Limited, SHADWELL.
WM. BUTLER & CO., BRISTOL.
KEMPSON & CO., Pye Bridge.

And to the following Gas Companies and Corporations—

ILKESTON.	BURY.	CHORLEY.
WIDNES.	BRIGHOUSE.	WHITEHAVEN.
HALIFAX.	MARKET HARBRO'	CHESTER.
ALTRINCHAM.	PRESCOT.	SOUTH SHIELDS.
DENTON.	SOWERBY BRIDGE.	LEEK.
ST. ALBANS.	LEICESTER.	IPSWICH.
DUKINFIELD.	DARWEN.	BOURNEMOUTH.
NORTHWICH.	NELSON.	SALFORD.
HUDDERSFIELD.	ORMSKIRK.	LUTON.
		HAMPTON COURT.

THE WIGAN COAL & IRON CO., LIMTD.,

Are exclusive Owners of the well-known HAIGH HALL & KIRKLESS HALL GAS COAL COLLIERIES, and supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, Cannel Nuts, &c.

MIDLAND DISTRICT OFFICE: 22, TEMPLE ST., BIRMINGHAM—SOLE AGENT: A. C. SCRIVENER.

TELEGRAPHIC ADDRESS: "WIGAN BIRMINGHAM." TELEPHONE No. 200.

LONDON DISTRICT OFFICE: 6, STRAND, LONDON—C. PARKER & SON, SOLE AGENTS.

TELEGRAPHIC ADDRESS: "PARKER LONDON."

GASEOUS FIRING A SPECIALTY.

Telegraphic Address: "DRAKESON, HALIFAX."

GAS ENGINEERS.
RETORT SETTERS.
IRONFOUNDERS.

SOLE MAKERS OF

"MITTON'S"
PATENT SELF
SEALING
RETORT-LID.

JONAS DRAKE & SON.

SOLE AGENTS
For
"HISLOP'S"
PATENT REGENERATIVE
FURNACES.
FOR ENGLAND, WALES & ABROAD.

OVENDEN, HALIFAX.

Telephone No. 43.
HALIFAX EXCHANGE.

CONTRACTORS.
FURNACE BUILDERS.
&c. &c.

SOLE MAKERS OF

"SETTLE'S"
PATENT COMBINED
SEAL-REGULATING
FLUSH-VALVE.

LONDON OFFICE:
60, QUEEN VICTORIA ST., E.C.

JAMES & WILLIAM WOOD, Limited,

GAS COAL AND CANNEL CONTRACTORS AND EXPORTERS,

57, GRACECHURCH ST., LONDON, E.C.

Registered Office—28, ROYAL EXCHANGE SQUARE, GLASGOW.

Wrought-Iron

And Fittings and Accessories.

LAMBERT BROS., WALSALL,

MANUFACTURERS OF
WROUGHT-IRON TUBES & FITTINGS for GAS, WATER, & STEAM,
BRASS GAS-FITTINGS, GAS-VALVES, STEAM & WATER VALVES, TOOLS, &c., AND OF
WARNER'S PATENT MARKET GAS STAND-PIPE.
LONDON: LAMBETH BRASS & IRON CO., Short Street, LAMBETH.

CLAYTON SON & Co LTD

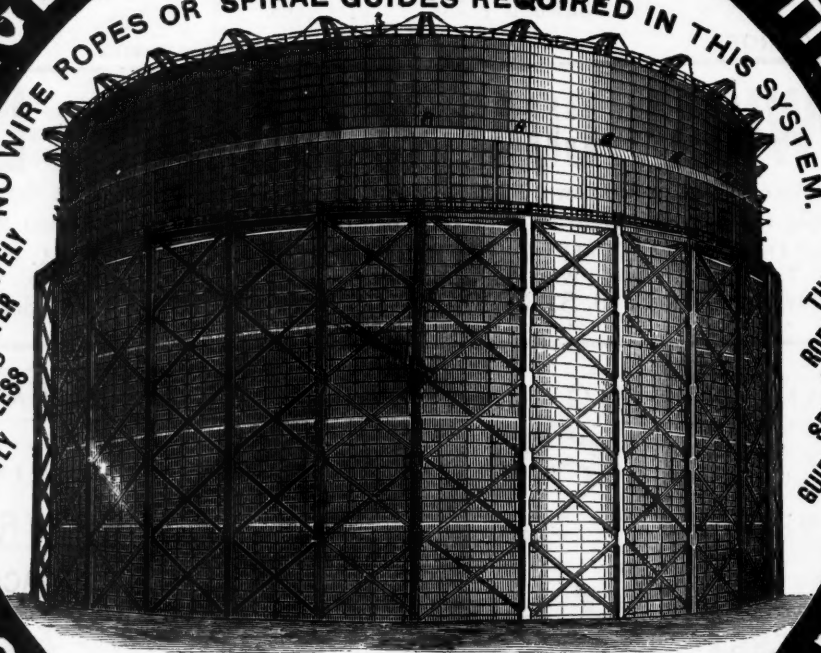
MAKERS OF

WORKS LEEDS

THE LARGEST GASHOLDER IN THE WORLD

GASHOLDERS OUR SPECIALITY

NO WIRE ROPES OR SPIRAL GUIDES REQUIRED IN THIS SYSTEM.



INFINITELY SAFER AND FAR LESS COSTLY THAN ROPES OR SPIRAL GUIDES.

CAPACITY 12 MILLION CUBIC FT.

ERECTED AT EAST GREENWICH FOR THE South Metropolitan Gas Company
IT HAS SIX LIFTS 30 FT DEEP EACH AND IS 300 FT DIAR

MAKERS OF GAS PLANT OF EVERY DESCRIPTION

ROOFS PURIFIERS &c. ALSO

ADDRESS LONDON 60, QUEEN VICTORIA ST.

TELEGRAPHIC "GAS, LEEDS.

GASHOLDERS OF ANY SIZE

ERECTED & COMPLETED WITHIN 12 MONTHS AND AT THE TIME SPECIFIED

STOURBRIDGE
RETORTS AND FIRE-BRICKS.
BEST QUALITY.

KING BROTHERS, STOURBRIDGE.
[See Illustrated Advertisement, Sept. 3, p. 511.]

HARPER & MOORES,
STOURBRIDGE.

MANUFACTURERS OF
BEST FIRE-BRICKS, GAS-RETORTS,
LUMPS, TILES, AND ALL ARTICLES IN FIRE-CLAY.
Proprietors of Best Glasshouse Pot, Crucible, and other Stourbridge Clays.
MANUFACTURERS OF GLASSHOUSE POTS AND CRUCIBLES OF EVERY KIND.
ESTABLISHED 1836.

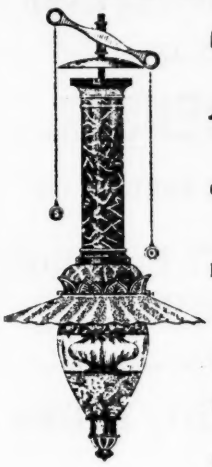
OSLER,
BIRMINGHAM.
MANUFACTURERS
OF GASELIERS
IN GLASS AND METAL.

WILSON CARTER & PEARSON,
GAS COAL AND CANNEL FACTORS,
Supply to any Railway Station, or for Export, all kinds of Fuel for Gas purposes.
ADDRESS CHIEF OFFICES:
Temple Buildings, 50, New Street, Birmingham.

ESTABLISHED 1861.

JOHN BROTHERTON, LIMITED,
IMPERIAL TUBE WORKS,
WOLVERHAMPTON,
MAKERS OF
TUBES AND FITTINGS
FOR EVERY PURPOSE.
PLEASE APPLY FOR LISTS. Telegrams: "IMPERIAL, WOLVERHAMPTON."

The Climax of Regenerative Gas Lighting!!



THE
"VERTMARCHE"
A 280-CANDLE POWER
PLAIN IRON LAMP,
CLASS A— **55/-**
LIGHT for LIGHT
less than half the price of any other Regenerative Lamp.
Manufactured in England.

HENRY GREENE & SONS,
153 & 155, CANNON STREET,
LONDON BRIDGE, E.C.
PARTICULARS AND PRICES FREE. AGENTS WANTED.

ARROL-FOULIS
Patent Automatic Machinery
FOR
DRAWING AND CHARGING GAS-RETORTS.

Full Particulars may be obtained from the Sole Makers,
SIR WILLIAM ARROL & CO., Limited,
GLASGOW.
[See Illustrated Advertisement, Sept. 3, p. 507.]

BEST & LLOYD
MAKERS OF THE BIRMINGHAM.

PATENT "SURPRISE" PENDANT,
WITH PATENT SHADE.

The ONLY GAS-PENDANT suitable for Domestic Lighting; a room 18 ft. by 14 ft. being beautifully illuminated with one Incandescent Burner.

Extract from the JOURNAL OF GAS LIGHTING, Jan. 8, 1895.
"IN CONJUNCTION WITH
THE INCANDESCENT GAS-LIGHT,
it quite **supersedes** the familiar three-light pendant. We are able to bear witness to the **convenience** of the New Pendant."

JOSEPH CLIFF & SONS,
INCORPORATED IN
THE LEEDS FIRE-CLAY COMPANY, Ltd.,
WORTLEY, LEEDS.

LONDON OFFICES & DEPÔTS:
Baltic Wharf, Waterloo Bridge.
WHARVES NOS. 2 & 4, INSIDE G.N. GOODS YARD, KING'S CROSS, N.
LIVERPOOL:
16, Lightbody Street.
LEEDS:
Queen Street.

MACHINE-MADE RETORTS

Have been made in large quantities for the last twelve years; and during the whole of that time, have been in regular use at most of the largest Gas-Works in the Kingdom. They possess the excellent quality of remaining as near stationary as possible under the varying conditions of their work—a quality which will be appreciated by all Gas Engineers and Managers. The generally expressed opinion is that these Retorts are the very best that are made.
RETORTS CAREFULLY PACKED FOR EXPORT.
Fire-Bricks, Lumps, Tiles, &c., &c., of every description suitable for Gas-Works.

ESTABLISHED 1825.

GAS TUBES

MANUFACTURERS OF EVERY DESCRIPTION OF

IRON OR STEEL LAP-WELDED OR BUTT-WELDED TUBES

FOR ANY PURPOSE.

SERVICE CLEANER.

HUTCHINSON BROTHERS,

GAS ENGINEERS, &c.,

MANUFACTURERS OF IMPROVED

WET AND DRY GAS-METERS.

STATION-METERS. LAMP-METERS.

TEST GASHOLDERS & GENERAL GAS APPARATUS.

BRASS MAIN & LAMP TAPS. UNIONS, FERRULES, &c.

The "Falcon" Lamplighter's Torch. Service Cleaners.

SYPHON AND OTHER PUMPS.

Wood and Wrought-Iron Purifier-Grids. Scrubber Boards.

WET AND DRY METERS REPAIRED.

FALCON WORKS, BARNSLEY.

Telegrams: "HUTCHINSON BROS., BARNSLEY."

LAMP SERVICE CLEANER.

CLAPHAM BROTHERS, LIMITED,

— ESTABLISHED 1837 —

LARGE REPEAT ORDERS

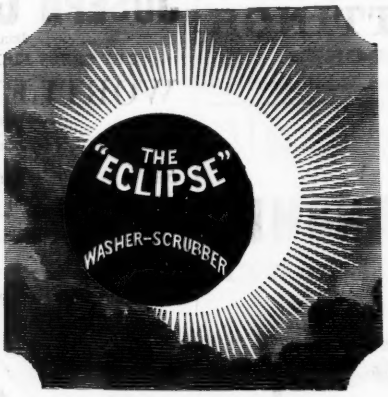
Have been received for

Laycock & Clapham's Patent

"ECLIPSE"

WASHER-SCRUBBERS.

Order Early.



GREAT SUCCESS

OF

Clapham's Patent

"ECLIPSE"

CONDENSER.

SEND FOR PARTICULARS.

CLAPHAM'S IMPROVED VALVES, PURIFIERS, AND RETORT-FITTINGS, MAINS, AND GENERAL CAST AND WROUGHT IRONWORK.

Catalogues, New Book of Testimonials, and full Particulars on Application.

Wellington, Nelson, and Market Street Works, KEIGHLEY, YORKS.

LONDON: Printed by WALTER KING (at the Office of King, Sell, and Railton, Ltd., 12, Gough Square); and published by him at 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, Sept. 17, 1895.

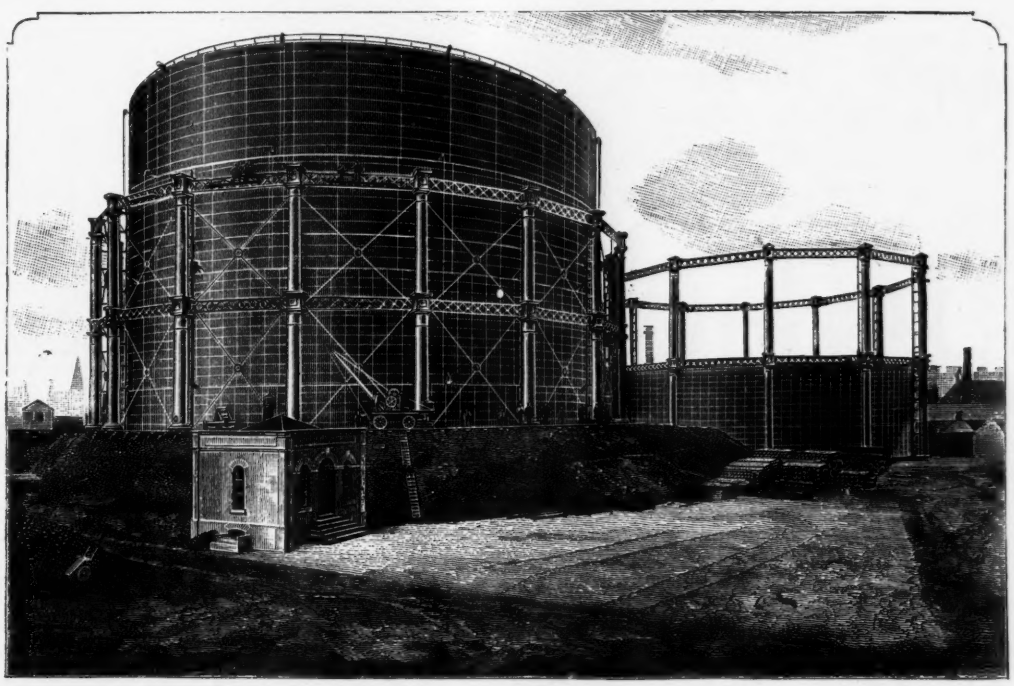
BIRKENHEAD

GASHOLDER

Four Lifts, 160 feet dia. by 30 feet deep.

Two Inner Lifts added on ROPE SYSTEM.

Engineers and others visiting Liverpool should see this most interesting piece of Engineering, illustrating modern practice in Gasholder Building.



Ashmore, Benson, Pease, & Co., Limited,

Gas-Works Contractors,

STOCKTON-ON-TEES.

London: Printed by Walter King (at the Office of King, Sell, & Railton, Ltd., 12, Gough Square); and published by him at 11, Bolt Court, Fleet Street, in the City of London—Tuesday, Sept. 17, 1895.